AMSTRAD CPC 464 USER

95p

April 1985

Software Sensation

Games Review Special

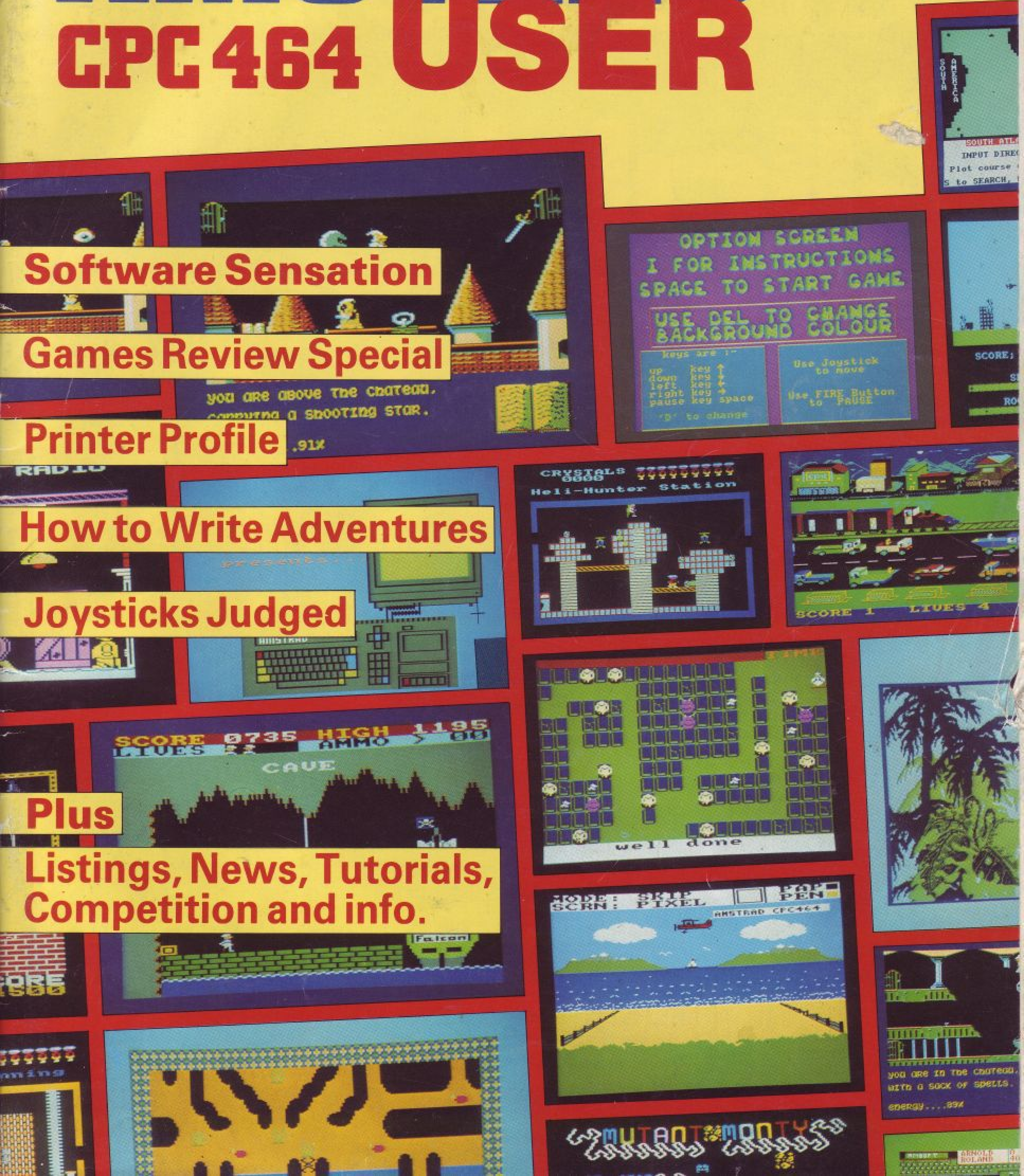
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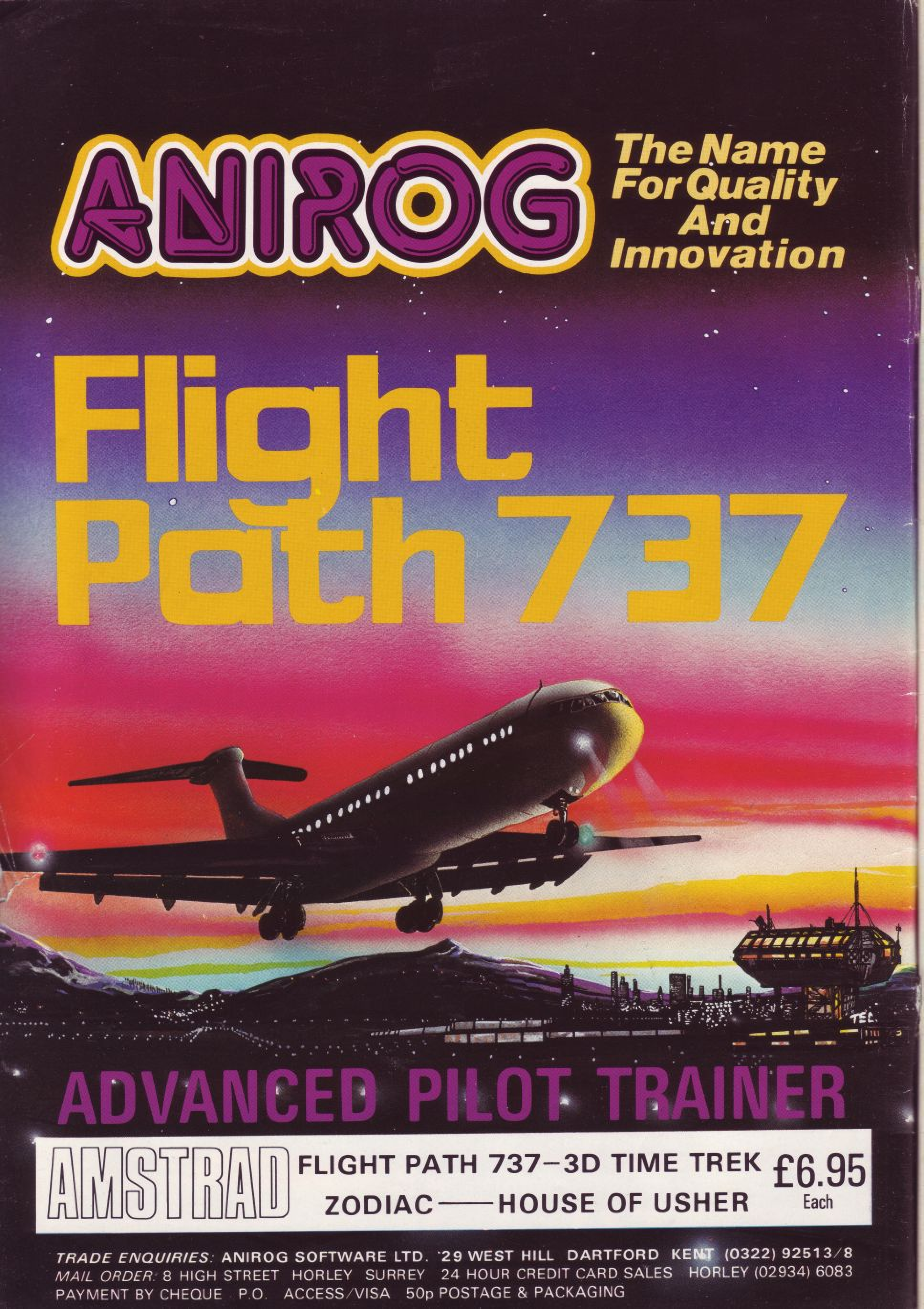
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Issue 5 April 1985

AMSTRAD CPC464 USER

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PROGRAMS

COMPETITION

Amstrad User is the OFFICIAL magazine for users of the Amstrad CPC464. It is published monthly, the next issue will be on sale from April 18th 1985. Back issues are avaliable from Amsoft Mail Order at £1.20 each (including postage).



This is the Award Amstrad won at the Computer Trade Association dinner. Despite it's being launched in the same year as some supposedly more powerful machines the CTA agreed with what Amstrad Users have known all along - The CPC464 is the computer of the year. A spokesman for Amstrad said "We have proved that we are a force and we intend to remain so". Locomotive Basic won an award for the best software.

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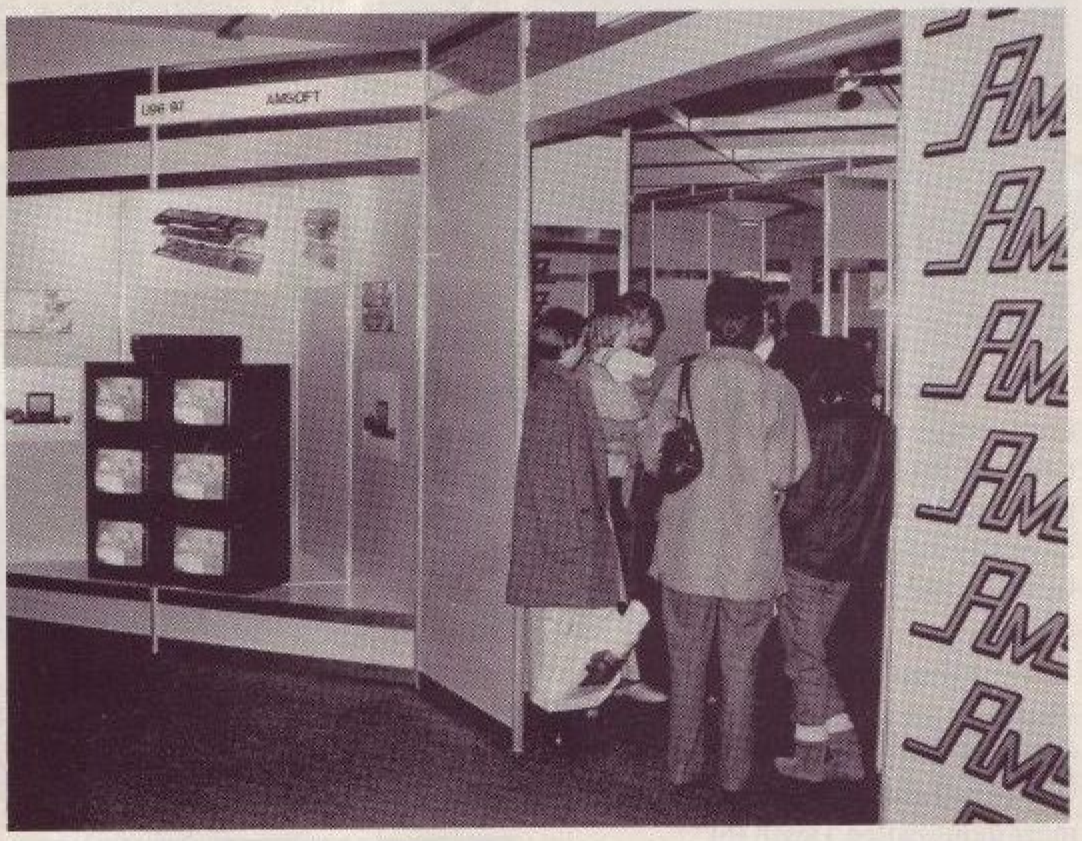
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NEWS

The 1985 L.E.T microcomputer show

On February 16th there was almost no news of exciting new products for Amstrad Users. By the following Monday there was loads. The day between had been spent at the L.E.T. microcomputer show. Being a Trade only show many of the projects were in a raw state, just showing traders what to expect. Simon Rockman took his notebook and camera.



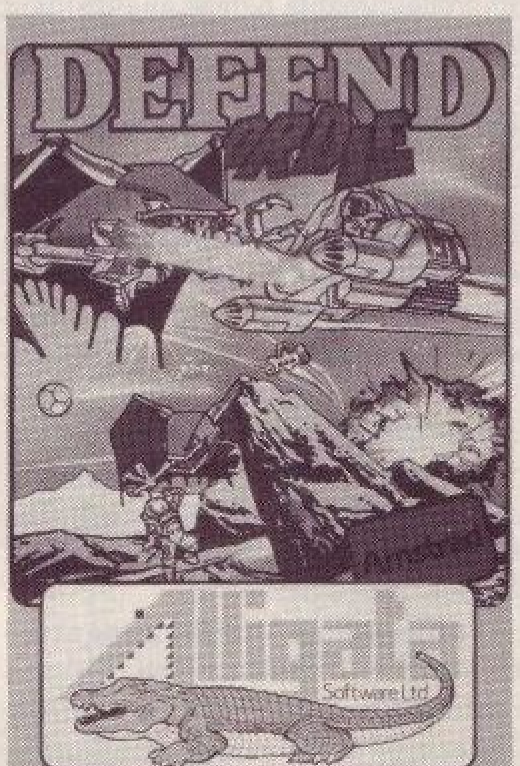
Amstrad at the L.E.T. show

Activision had a very smart stand, which lacked any Amstrad computers but made up for that with the promise of some very exciting software -including 'Ghostbusters ', 'Master of the Lamps' and 'The Music Studio'.

Addictive Games launched Software Star as a sequel to Football Manager. How anyone can be so interested in football beats me, still some people like looking at a screen full of numbers.

The prize for the noisiest stand must go to Alligata. Their 'Defend or Die ' game makes the most of the stereo and two large speakers proved the point.





The game plays well too.

Suffering the brunt of this noise wer Adventure International who produc games based on Marvel Comic cha racters. Spiderman was giving ou autographs and Adventure Interna tional promised Amstrad versions c the software in June.

Chuckie Egg must be the most widel available game program. A 'n ' F seen to have produced a version for ever major computer, and some minor ones so it is no surprise that CPC46 Chuckie Egg is on its way witl Chuckie Egg II soon to follow. It 's a good game - be careful you might ge addicted.

Argus Press Software had more of ar open plan lounge than a stand but very little CPC software. When asked about an Amstrad version of 'Give my regards to Broad St. ' I was told that it would be a while, since they had to write 'Alien ' first. Both of these games are not quite adventures nor are they are arcade games but interesting nonetheless.

Another game which cannot be classified is 'Lords of Midnight ', this has a bit of everything in it. Thousands of graphical locations, an adventure element and a bit of wargaming. This is being written for Amsoft by Beyond who wrote the Spectrum and Commodore 64 versions.

Many large companies have announced that they are about to take the software world by storm and start lashing out loads of money to produce some very average programs. Like the others, British Telecom made all the bold announcements but then they have gone on to produce some stunning software. None of it is running on the CPC464 yet but conversions are planned. The Gyron game is technically brilliant; it puts you in a maze with large alien balls rolling around. A must for the CPC464 but conversion is a fair while away. The authors have a more important job first - Spectrum and '464 Elite. This is the game which took the BBC world by storm. The Commodore version is nearly finished, and next will be the Spectrum version

and sometime around June the Amstrad CPC464 variant will appear. Having practised on the Sinclair machine the Amstrad version should be stunning.

One of the most popular features of state-of-the-art arcade games is 3D. The new Bubble Bus title Hi-Rise has joined in with this theme but was still too far from completion to be shown.

The Game of the Show

There was something of a party on the CRL stand. They were showing a demonstration of 'The Rocky Horror Show ', again this has been written for the Spectrum but a '464 version is underway and should be finished in April. The game is based on the cult stage show and looks set to be a sure-fire winner. I know I can 't wait for my copy and the chance to do the 'timewarp '.



Airbourne Antics

Competition for the best new Amstrad game of the show was tight, 'Dark Star ' from Design Design just pipped Digital Integration 's 'Fighter Pilot ' at the post. Both of these games must make number one in the CPC464 software charts. Both games will be reviewed next month. 'Fighter Pilot ' by a real fighter pilot, who described the game as 'The best eight bit flight simulator '. As I don 't know any spaceship pilots I will have to get a games player to test out 'Dark Star '.



DK ' Tronics have added a light-pen to their range of peripherals, from the description of how it works it should be pretty accurate. However they did not have any equipment set up so you will have to wait for an 'Amstrad User ' review.

Durell were another of the software houses to have software on the way. Combat Lynx was still not finished but will be released soon, along with a new maze game called 'Death Pit '.

The Welsh company, Gargoyle Games were as enthusiastic about the CPC464 as anyone I have come across. They claim that it is easy to convert their award winning Spectrum stuff and will soon be finished. The games have unpronounceable names and brilliant animation.

Simple Adventures

If you want to write adventures and can 't yet program you have two courses of action. You can either study the articles in this magazine on how to write adventures, or you can get the Quill from Gilsoft. This makes adventure programming very easy. All you need is a good plot and twenty minutes with the instruction book. The Quill won an award for the utility of the year, and deservedly so.

The best selling Amstrad game at the moment is Technician Ted. Hewson consultants, who wrote the Manic Miner type game were celebrating the program reaching number 1 in one trade chart and number 4 in another.

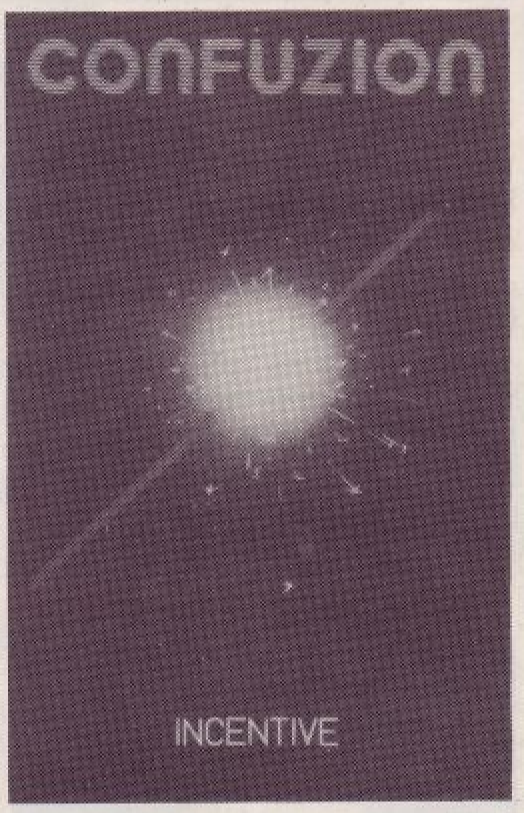
They also let us have a copy of 'Air Traffic Control ' which will be tested by our resident jet pilot.

Hi-Soft sell lots of interesting utilities, including 'Devpac ', 'Pascal ', and 'Font 464 ' - a character generator. They had nothing new but said that 'C ' was not far away.

The little known software house Icon have some plans Amstradwise; they will have a game called 'Frankenstein 2000 ' out in April, one called 'Caveman Capers ' in May, and 'Contraption ' in June. Full reviews will appear in due course.

Confuzed

Incentive are the people who wrote 'Splat! ' They have now become the first company to write a game for the CPC464 and then convert it to other machines. The program is called 'Confuzion ' and has you racing against time to set off a bomb. It is a cross between the arcade game where you have to shunt trains, and a sliding block puzzle. 'Confuzion ' is the work of Paul Shirley who produced 'Splat! ' and 'Quack-a-jack '.



Level 9, the adventure people, launched their new game, called 'Emerald Isle ' which is a graphical adventure. All Level 9 adventures are well written with detailed text and difficult puzzles, so although I have yet to play it, 'Emerald Isle ' promises to be an absorbing adventure.

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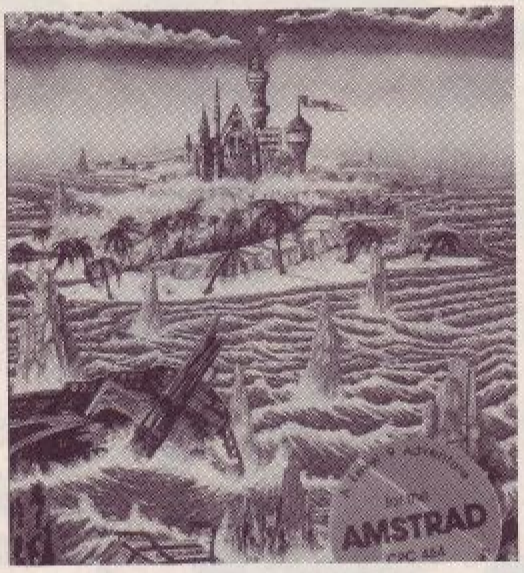
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MYRDDIN FLIGHT SIMULATION AMSTRAD CPC 464





In the Jan/Feb issue of Amstrad User we broke the news of Jeff Minter 's new program. Called 'Psychodelia ' the program is 'A light synthesiser '. Jeff Minter 's company, Llamasoft showed the program running on many different machines and promised a CPC version 'Very soon.'

Interceptor Software have a reputation for the best graphics in Amstrad adventure programs. They revealed how the artist and programmer can work together despite living 250 miles from each other. The graphics are designed on an 'Arnold ' and then transferred to a Spectrum. This uses a modem link to send the program down the 'phone lines to another Spectrum. They are then transferred back to the Amstrad for the final program.

Bilbo to Arrive

Melbourne House did not have any computers set up, but they did have 'The Hobbit ' and 'Sir Lancelot ' as well as their new book 'The Ins and Outs of the Amstrad '. Now that 'The Quill ' has been finished we can expect to see an Amstrad version of 'Hampstead ' from Melbourne House.



A Byte on the Side

The first sign of long-awaited sideways ROMs were to be seen on the Micropower stand. As with most of the products on show these were still a way off, but it is nice to see someone making headway with this idea. The program they were showing in ROM was a database, however they do have a new games release, 'Killer Gorilla ', which should be available soon.

Wally and Co

For a while now the Amstrad User office has been finding some odd posters in the daily post. The reason for this was revealed at the show. The posters feature the characters from the new Mikro-Gen game, 'Everyone 's a Wally '. Wally Week and his family were at the show to advertise the game.

The Mirror Group of newspapers have a software branch, called Mirrorsoft, and the standard is high. They demonstrated some pre-production versions of their educational software, featuring the Mr Men.

Gold Digging

Ocean Software have finished 'Gilligan 's Gold ', a sort of ladders and platforms and arcade hybrid. It is based on a real arcade game which was a bit of a flop. However as a home computer game it is great fun. Future releases from Ocean include Daley Thompson 's Decathlon, Hunchback II and Kong Strikes Back. All these are due to be launched in April.

The machine code assembler/monitor scene is getting a bit crowded now, however Picturesque feel that their product is strong enough to compete. There is always room for a good utility and their program called 'The Code Machine ' will be reviewed as soon as we get our hands on a copy.

Lets Communicate

Modems are the 'in ' thing, with many companies saying that they will be producing an interface to allow the connection of a modem to the CPC464. The first to succeed have been Protek Computing who had a serial interface on show. We have now taken delivery of our interface so you can expect a review soon.



Supersoft have been around for a long time, they started out with Commodore equipment but have now moved over to other systems. Their shoot 'em up program is called 'Interdictor Pilot ' and is available now.

Terminal Software have had a bit of trouble in the past with the copyright for the music in their 'Lazy Jones ' program. However all this has been sorted out - without any changes being made to the tunes. We can hope to see the game soon.

Vortex Software are included in the happy band who have started converting Spectrum bestsellers for the CPC464. The first conversion is called 'Android One ', a zapping maze game.

Despite all this Amstrad interest, there was only one stand which was completely Amstrad dominated; that was the Amsoft stand. There was no new computer, but there was plenty of new software, including 'Jammin ', and there was a chance to use the new JY-2 joystick.

I felt that this was the first show where the CPC464 had a really firm grip. No longer was it lumped in with the Enterprise and MSX computers as a machine which might be important in the future. The Amstrad CPC464 is a hit with dealers, distributors and software houses.

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Letters to the Editors



What's in a name?

I noticed in an issue in a popular magazine (nameless of course) that there is a stack of data which when read brings up a bunch of names. Some of these are obviously connected with Arnold, Arnold being one of them, but some are not so obvious. Could you explain why and for what they were used. I'd also like to thank the receptionist at Amsoft for tracking down my membership package. Apparently it had been to Luton and back two times in the space of 3 months.

S Elward
Luton, Beds

Amstrad User: The alternative names in the ROM are present for the benefit of certain overseas territories where the machine is sold under different brand names. "Arnold" was left in for sentimental reasons.

Plain brown wrappers

I'm an absolute novice at computer programming. But I like to experiment, and after noticing in the CPC464 user guide that the CALL& command should be used cautiously I started playing. It seems that if CALL&BD00 is used at the very beginning of a program, it disables the [ESC] key.

Great mag, but delivery bothers me. It's all very well sending it in a see-through covering, very pretty though it is, but it gives a reasonable advertisment to any would-be thief. After all you only have to ask an insurance agent to find out home computer thefts are on the increase. So why not send them in plain white with Amstrad or Amsoft stamp on. Saves on ink costs as well.

P. Wilson
Ilkley, W. Yorks

Amstrad User: All the thrills of the OS are available in SOFT158, and we unreservedly recommend any user with a yen for CALL to delve therein. As far as wrappers are concerned, we have not been advised of any problems so far.

Raced out

I am so satisfied with Arnold and most of his software that I was surprised that Amstrad would lend their name to a pathetic game "Grand Prix Driver".

I waited months for this game. When it arrived it promised on the cassette insert that "the program contains all the thrills and spills of the Formula One Race Track". Utter rubbish! It is a very weak program, not much better than a 4K program "Night Runner" that I typed in from one of the magazines. I really think that the advertising blurb is misleading "superb graphics" oh yes? Most of the graphics are simple blocks. The best graphics are in the "Game Over" sequence which goes on for far too long. "Action packed reality" is, in fact, what is missing. "Putting you in the drivers seat" -you are watching the car from behind. Steering repsonse is so slow that avoiding other cars needs far more luck than skill.

All in all, the game is so disappointing and such a waste of money that it should be withdrawn.

To end on a much more positive note, the "Amstrad User" improved vastly between the first and second issue and is now an indispensable magazine. Looking forward to the next one!

A R Daman
Gillingham, Kent

Structural faults

I was pleased to receive the October/November edition of "CPC464 User", and must compliment you on an excellent magazine, and your authors on some interesting programs.

It is quite noticable, and I am as guilty as anyone, that your old programming habits die very hard. All of your published programs were littered with GOTOs, and didn't appear to muster a WHILE between them. It is a shame that gifts provided to assist structured programming should be ignored in favour of the easy way out.

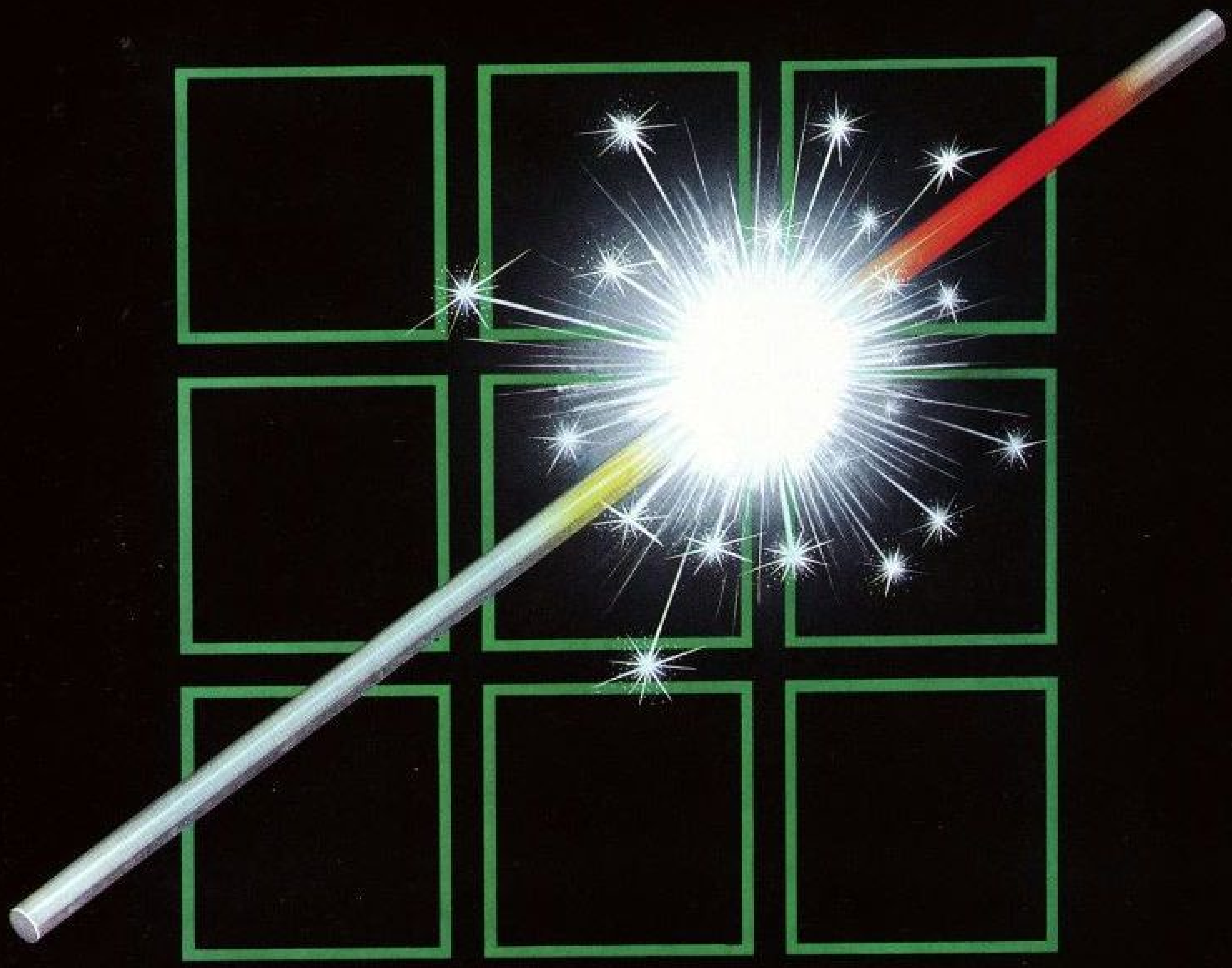
I offer the following subroutine as an illustration of the use of WHILE, and a more efficient way to use INKEY$. Consider the following code:

```
3000 PL=0:WHILE PL=0:A$=INKEY$:
     if A$>""THEN PL=INSTR(PT$,UPPER$(A$))
3010 WEND:RETURN
```

The subroutine uses a list of 'acceptable' characters, stored in PT$. This may be a single character (say

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'space') or a multiplicity ("YN","ABCDE","12345"etc.) It waits for a key to be hit, and then checks whether or not its character is included in the list. If not, the hit is ignored, otherwise, the variable PL points at its location in PT$, before RETURNing. The major benefits of this are that unacceptable input is ignored, and that the accepted character is translated into a numeric variable which can be used directly in an ON PL GOTO (or GOSUB preferably). For example, the addition of a line:

```
2990 PL$="YN"
```

gives the subrouting the facility to deal easily with "Yes/No" questions. For example, if we take the 'DIY Typewriter' program from the last issue, line 90 becomes:

```
90 GOSUB 2990:IF PL=1 THEN 140 ELSE 190
```

this saves three lines, and similar savings can be made at lines 340,430,560 (PL$=" Q") and 990. Lines 1220 to 1300 are replaced by:

```
1220 PT$="DPRACSI":GOSUB 3000
1230 ON PL GOTO 480,300,620,710,1100,800,890
```

Whilst the line savings are relatively minor, since the program is small, the ardent program copier will surely appreciate the reduction in typing effort.

P G Hewitt
Lancashire

Sexist and smug

You must be aware of problems that girls in school can face in getting time on the schools' computer equipment, because boys tend to hog the equipment it results, too often, in girls not getting fair use and ultimately losing interest.

So, perhaps they have a better chance at home on the family home computer?

Perhaps the user magazine of the Amstrad home computer will encourage girls (and women of all ages, for grown up boys hog machines too!) to participate in the varied wonders of hardware and software? - the satisfaction gained in writing a program that works - it may even do something useful - or of achieving a level of understanding how a computer system works? - the amazement of playing arcade games which exercise pattern recognition and sharpen reflexes? - the escapism and exercise of memory and lateral thinking with a good adventure game? ... and more.

No Chance!

The truth is you have put girls and women firmly in their place.

I refer, of course, to page 50 in issue 2. The picture uses a representation of a female body to provide titillation for men (deny it if you can!).

It is totally irrelevent to the rest of the magazine and can only reinforce the idea in womens' minds that have computers are of interest and benefit to men and boys only.

Please do not let smugness about the value and success of the CPC464 cloud your judgement.

I will continue to recommend the AMSTRAD computer to whoever will listen, but the CPC464 USER? - not yet!

C J Speight
Huddersfield, W. Yorks

Keyed up

If, like me, other readers have found the explanation in Chapter 1 of the User Manual regarding pre - programming keys using the KEY command a little cursory, then the following may help:

1. Using Key-pad:

Straightforward, using the integer expression required with reference to Appendix III p.15 as described in the Manual.

2. Using Key-pad:

To pre-program, e.g. the 1 key, choose an integer in the expansion character range 141-159 and look up its key number in Appendix III p.16 -which is 64 in this example. Type in the following commands to pre-programme the 1 key with a CLS function:

```
KEY 150 ,"CLS"+CHR$(13)
KEY DEF 64,1,150
```

To pre-programme the 'A' key substitute 69 for 64, and so on,

M H Peachey

Demo Request

I am writing to say I think I can solve a problem which bugs people everywhere. Where I live there is only one shop which lets us actually have a go of the game. The rest won't let us touch them so how are we to know what there like?

What I was thinking is if you got blank tapes them put 1 screen of each level and explain what you have to do then you could get more than 4 or 5 games on a cassette. If you have them programmed so they cannot be played only seen and this I think would help to show the different games.

Once all the different games have been programmed they could be sent to different shops all over the country and the tapes could be played in the Data recorder and displayed in the shop all the time. It would be alot cheaper when you think all those games that are not bought because the buyers don't know what there like.

B Ryan
Bexleyheath, Kent

Amstrad User: It's a very good idea, and much easier now that disc drives are becoming more widely available.

"PROGRAM FUNCTION KEYS"

When playing Adventure games, one can get very tired of typing in some of the common words, particularly if your typing is as bad as mine.

So I used the programmable keys of the CPC464 to set up the cursor keys for the directions (North, South, East and West) and some of the number pad keys to be keywords.

The program listed below defines the cursor and copy keys to be function

keys (using KEY DEF), and then attach text to each of the function keys using the KEY function. Finally a prompt is output followed by the RUN command to actually load the Adventure game.

```
100 REM redefine cursor keys
110 KEY DEF 0,0,146
120 KEY DEF 1,0,141
130 KEY DEF 2,0,142
140 KEY DEF 8,0,143
150 KEY DEF 9,0,144,145
160 REM
170 REM now add text
180 KEY 146,"N"+CHR$(13)
190 KEY 141,"N"+CHR$(13)
200 KEY 142,"S"+CHR$(13)
210 KEY 143,"W"+CHR$(13)
220 KEY 144,"LOOK"+CHR$(13)
230 KEY 145,"I"+CHR$(13)
240 KEY 135,"TAKE"
250 KEY 136,"DROP"
260 KEY 132,"OPEN DOOR"+CHR$(13)
270 KEY 133,"CLOSE DOOR"+CHR$(13)
280 KEY 134,"ENTER"
290 REM
300 REM output prompt and load game
310 PRINT"Put Adventure Tape in cassette"
320 RUN""
```

C.Hill
Chelmsford, Essex

Amstrad User: Beware in case some adventures claim function keys for themselves.

Radio 464

I like to listen to music while using my CPC464. The radio stations are my most convenient choice for the sort of background music I prefer. Sometimes I tune to BBC Radio 2 on FM at about 90MHz, but have found this signal to be obscured when I have the CPC464 operating. Is this coincidence or is there a logical explanation?

Is it relevant tht my stereo and my computer are plugged in to the same double wall socket, i.e. side by side? Or am I merely exposing my total ignorance regarding anything electrical.

M Gleave
Blackburn, Lancashire

Amtrad User: Aha, the CPC464 emits a special signal so we can send the CPC464 User detector vans around and check who's not bought a copy! Yes, the CPC464 in common with other computers, your TV set and probably a host of other electrical appliances emits random low power radio signals that can be picked up on a radio in the immediate vicinity. There isn't a lot you can do apart from move the aeriel of the radio away from the computer: distance between the two is the only practical cure.

Suggestion time

I felt I had to write to you with a 'mixed bag' of comments.

As the proud owner of an Amstrad CPC464 (note the full title), which incidentally is my first home computer, I am really delighted with its facilities and performace. The whole family is now hooked.

I joined the Amstrad Club and have now received membership and it is really concerning this where the 'mixed bag' comes in.

Firstly I should say that the magazine is excellent - good information, useful articles and *clear programs.*

Finaly the competition. The winners are all of 'professional' standard. We beginners do not stand a chance. The prize is excellent and obviously attracts the top people as contestants. Can you do something for the rest of us e.g. best program in say 30 or 40 lines? Also I was expecting winners programs to be listed in the magazine but it appears they will be for commercialisation.

Club membership is not cheap at just under £20 and if all it brings is 6 magazines a year (mail order at 15% discount is no good if there are delays and missing items) then this works out at £3.30 each - expensive.

My comments are intended to be constructive and, as mentioned, I am 'over the moon' with the hardware and software. Your planning on this has been immaculate - please do not let us down on the customer services side.

A Gallard
Eastbourne, Sussex

Amstrad User: We have changed the competition rules to allow for the judges discretion to spread the prize money around - and CPC464 user is now monthly.

Eighth time lucky

I feel that I must put print head to paper to give you my views of the CPC464 and it's various peripherals.

Firstly I feel that I have had a fair bit of experience in the computer industry, being a service engineer on computer systems and because I have had some 7 micro systems over the past 6 years.

I would like to draw reference to the excellent un-biased letter from G.S. Sinclair in an eariler issue of USER, where he mentions the Concise Firmware Specification at £20 .....GASP....!

What users of the CPC464 should be grateful for is the fact that your good selves and Locomotive have seen the need for "BACK UP" for the machine, and have done something about it...sharpish......unlike other "Main Manufacturers" who made users wait 3 years for their Advanced User Guide-......HUM.

I would also like to thank you for your thoughts of "us boffins" out here-.....what computer company made available a full service manual in the first 2 months of production ? (a note to other boffins out there....BUY IT....).

Thanks also for the Diy typewriter program in the last user.. you have lost a sale of easi-amsword...and saved me some brass!

Anyway I had better finish before I run out of paper in my CP-80 Printer.....and Diy Typewriter gives me --zero lines remaining- etc etc.

Please keep up the good work, and thanks once again, for not leaving the users out in the cold after they have "paid up".

R J Taylor
Selston, Notts

Prehistoric predicament

And Can anybody help me in "Lords of Time" How do you kill the dinosaur?

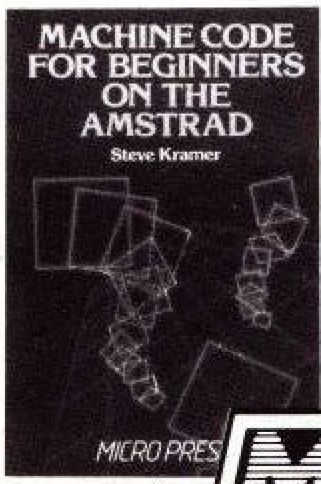
B J Krolick
Hove, Sussex

PROGRAMMING YOUR AMSTRAD CPC 464

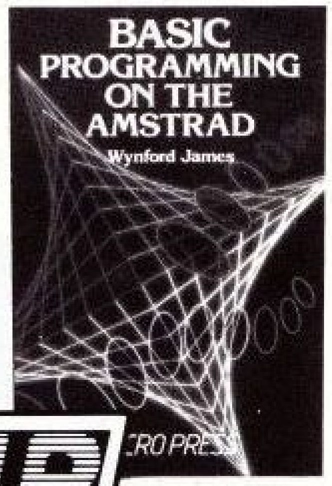
Machine Code for Beginners on the Amstrad

by Steve Kramer

This book is intended for the beginner and explains the concepts behind programming in Machine Code, the instructions which the Z-80 CPU understands and how to use them. The operating system routines are introduced at appropriate stages and extensive use is made of them in order to allow results from programs to be seen immediately.



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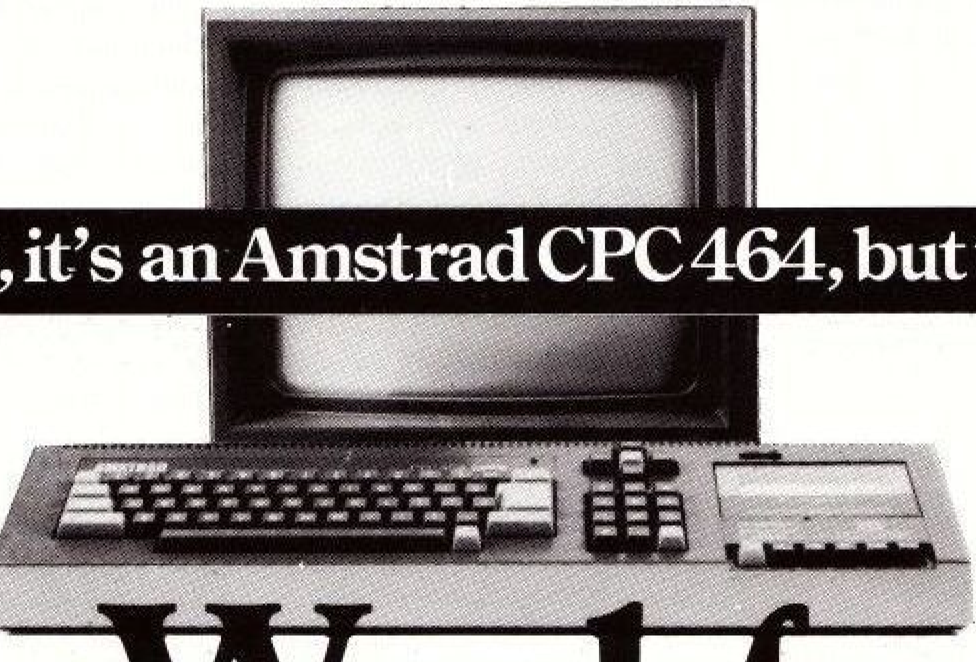
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BOOK REVIEWS

Peter Green

BASIC programming On The Amstrad

Wynford James
Micropress
ISBN 0-7447-0024-8
229 pages
£7.95



Although ostensibly having the same aim as *The Working Amstrad*, this book takes virtually the opposite approach. *The Working Amstrad* teaches programming, and introduces the AMSTRAD command words if and when it needs them. This book is more of an expanded manual, which works through the CPC464's BASIC commands and explains how they are used with the aid of example programs. Indeed, the back-cover blurb describes AMSTRAD's own User Guide as a sprint through the BASIC, while this book is for "for joggers, and walkers, and those who are not sure they can even reach the starting line."

As such, the book has a very elementary treatment. The first two chapters are pitched at the level of someone who has to be told to check that the mains plug is in the wall if the computer won't come on. It might help someone who has never seen a computer (or even a typewriter!) before in his life, but most people interested in computers these days have picked up a smattering of the basic terms by browsing through magazines.

From then on the book covers all the basic aspects of the CPC464's abilities, as you can see from the chapter headings. These include Drawing Pictures, Loops, Making Decisions, Strings, Loops and Lists, Games and Graphics, and Sound and Music. As I have mentioned, many of the example programs are fairly trivial and aimed only at making a point rather than providing a useful piece of software. however, Chapter 9, Planning a Program, does offer some useful hints on how to go about writing your own software.

For example, there's the trick of programming the function keys with various common keywords, and immediate commands to tidy up the screen display if a program crashes during testing. The author then goes on to show how you might tackle the design of a games program, choosing that hardy perennial 'Blitz' so beloved of magazine contributors. Although the reasons behind it are not brought out in great detail, it's good to see that this book also recommends the use of structured, modular programming and follows this advice in the example.

Once all the different routines have been covered, the author explains how to test a program for bugs and fix them, using several examples of failure-of-logic included in the examples. The information offered is useful but brief, and the author graciously admits that the space devoted to the CPC464's BASIC leaves too little for programming theory, suggesting that you follow up his book by reading other titles or magazines. A book that would suit the absolute novice, then, but I have to echo those closing remarks by Mr. James.

The Working Amstrad

David Lawrence & Simon Lane
Sunshine
ISBN 0-946408-60-2
216 pages
£5.95

The Amstrad CPC464 might be considered rather lucky to have been launched so late in the day as regards the home computing boom. Early computers suffered after their release from lack of decent software and poorly-written 'bandwagon' books. But the CPC464 already has many of the best games for other machines running on it, and this book is the latest in the Sunshine 'Working Micro' series which has been running since 1982. The pedigree shows.

The concept of the series is to avoid the usual collection of Space Invaders and Pacman beginner's programs that jerk their way across the screen, and to provide instead a thoroughly detailed guide to 'proper' programming techniques, using the facilities of the given micro. There is a need for such a book: as someone who has worked for several years on computing magazines, I can testify that programs from home users read like a six-year-old's essay rather than a best-seller, to use a literary analogy.

A common thread runs through all the example programs in the book. Modular programming is employed, the authors stressing how vital this approach is if programs are to be easy to design, test, debug, and modify. The various subroutine modules are printed separately (dot matrix listings from a working program, so you know they are accurate), together with sections on the intended function, a line-by-line description of how the module works (together with any background information that might be needed), and how to test the module independently of the rest of the program. This structured teaching

approach makes it important to read the book from start to finish as a series of lessons: dipping in at random because you fancy a particular program might miss important points covered earlier.

A side effect of this presentation is that boring slabs of text are avoided, the frequent sub-headings, short blocks of listing and interspersed text breaking up the pages and making the book pleasant to look at and a joy to read.

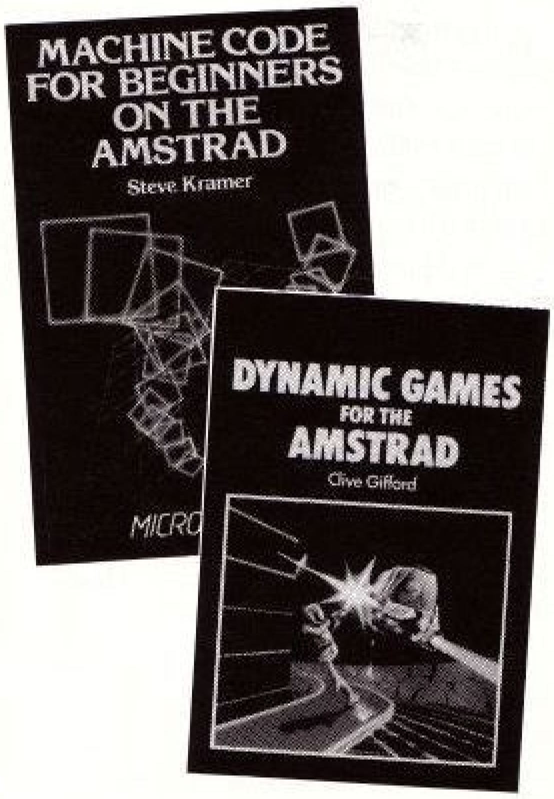
The book covers all the major computer applications and Amstrad facilities. Chapter 1 deals with the use of interrupts and has four programs; two types of clock, an 'alarm' type program that can remember 16 different events, and a stopwatch. Even this first chapter takes these basic examples as an excuse to wander off into the realms of geometry, shape-filling and menus.

Chapter 2 covers graphing applications, in line, pie and 3D bar form. Then comes a chapter with programs for character design, screen drawing and creation of tunes. Chapter 4 turns to more serious matters, such as a filing system (personally I've always believed an exercise book is more practical for filing than any home computer, but it's nice to see the theory explained), a stock control program, a simple word processor and a multiple-choice test generator.

Finally financial applications are dealt with in Chapter 5, which has a bank account manager and accounting package; again, of less practical use than pen and paper, in my opinion, but well-explained nonetheless.

Two things are present in the book which are depressingly absent in much technical writing: good English and good proofreading. The book is practically error-free, although it was a bit disconcerting to find the word 'not' omitted from a sentence on page 3, thus suggesting that you might want to start a program with GOTO in order to clear any variables you had just set up: also the caption for Figure 3.2 belongs on 2.3. Quibbles, quibbles: if these were the worst I could find the publishers are doing OK. I do think the authors have made a bad decision by referring to variables in upper case in the text when they are lower case in the listings, the Amstrad doesn't mind which you use but the beginner might be confused.

They also fall into the trap of shouting "Bug" when something unexpected



happens, in this case the failure of the `SYMBOL AFTER` command when a file is open. There *are* bugs in the AMSTRAD but this isn't one of them: it happens because `SYMBOL AFTER` needs `HIMEM` at the bottom of the symbol table, and opening a file moves it. The feature is documented in the Concise BASIC Specification (SOFT 157) together with a way to prevent it, but I admit it would have been better to have mentioned it in the User Guide.

Overall, then, an excellent book which I particularly recommend to beginners as a way of nipping any bad programming habits in the bud. If you only buy one book on programming, make it this one.

Machine Code For Beginners On The Amstrad

Steve Kramer
Micropress
ISBN 0-7447-0025-6
189 pages
£6.95

Amstrad have been very kind to the machine code programmer. Usually it is necessary to work out the inner secrets of the machine yourself, which is why most of the best software for a computer is written by a few programming geniuses and appears months after the launch of the machine. Arm yourself with the Concise Firmware Spcification (SOFT 158) and a Z80 assembler (two are currently available for the CPC464), and you have all the tools you need to enter the wonderful world of machine code.

Machine code is rather more demanding, and less forgiving, then BASIC, and a guide is helpful. So it isn't surprising that one of the first books to appear for the CPC464 is this one, which is intended as a tutorial for newcomers to this thorny topic. Rather more surprising is the fact that the author has taken the trouble to enlist two machine code novices to advise him in the preparation of the manuscript, unlike many people who assume too much awareness on the part of the beginner. And most surprising of all is that these novices let him get away with badly structured text, meandering non-sequitors, and gross errors of fact.

This sounds harsh so I'd better justify myself, quick. I believe that, when you are trying to teach beginners anything, you have a duty to eliminate all errors. It's no good hoping that reader will pick up the mistakes: he's more likely to give up in confusion when something makes no sense, because "if it's in the book it must be right".

OK, let's take Chapter 10. This deals with the Z80 instructions that work on a single bit. It contains a single example program, two-and-a-half pages long, with no explanation of how it works (indeed, the author tells you not to bother to type it in), and it's introduced with the words "A number of 'dirty tricks' have been employed in the program . . . See if you can find where the 'Y' at the end of message 8 in line 1140 goes." Dirty tricks? In a book for beginners? And no explanation of what they are, of course. Line 1140 doesn't contain a message: message 8 is in line 1240 and I can't see what's so special about the Y. Nor do I see why I should waste my time trying to work out what the author is getting at: it is the job of a

teaching book to explain, not set riddles, and I see no reason to do the author's donkey work for him.

In Chapter 6, Simple maths, program 6.8 (referred to as 6.9 in the text) has a deliberate bug in it. Having identified the problem, the text rambles on for two pages about a couple of new instructions, then returns to the bug and shows they can be used to fix it. After a sudden change of subject and trying to cope with new instructions, the reader has probably forgotten the original problem. This messy, almost random presentation of the subject matter is one of the book's biggest failings, making it hard to follow the author's thread.

A final example: throughout the book the author has made use of two system calls, one to get a keypress from the keyboard and another to print the character whose ASCII code is in the Z80's accumulator. Chapter 15 tells you that the print routing is part of the Key Manager (it's actually in the Text VDU) and gets the lables GETKEY and PRINT swapped over. Sigh.

I hesitate to recommend this book, because anyone capable of spotting its shortcomings and errors is probably canny enough to get what they need from a general-purpose Z80 book and the Concise Firmware Specification (admittedly the latter is a bit expensive for dabblers). It does provide an Amstrad-specific view of things and a listing for a hex loader (although you'd certainly have to buy an assembler for any serious work), but I'd have to say you're better off buying a book like Programming The Z80 by Rodnay Zaks (published by Sybex, sold in the UK by Computer Bookshop, Birmingham), or else wait a while for something better to appear.

Dynamic Games For The Amstrad

Clive Gifford
Interface Publications
ISBN 0-947695-16-8
210 pages
£5.95

This book is simply a collection of 50 games listings for you to type in and play: it isn't intended as any kind of teaching aid and no explanations of how each program works are given. However, all the listings are dumped to dot matrix printer, presumably from working programs, so if you get an error the odds are good that its your typing that's at fault (good practice in debugging, this!). The games, some short, some long, are split into various types -- arcade games, text adventures, stategy and logic (such as Gomoku and draughts), brainteasers (Solitaire, for example), gambling, graphics and sound games. The author assures us that the games are all very playable, and that he's weeded out any slow ones (despite that fact that all the games are in BASIC). Since I haven't got time to type in 200 pages of listing we'll have to take his word for it! I did type in Four-in-Row, picked at random, and it appeared to work OK except that I invariably beat the computer.

There's not much else you can say about this book. It'll keep the kids amused for a while it'll brush up your two-fingered typing a treat, and you may pick up some useful programming tips by studying the listings. Where else can you get games that cost about 12p each?

Bells And Whistles On The Amstrad CPC464

Jeremy Vine
Shiva Publishing
ISBN 1-85014-063-4
86 pages
£4.95

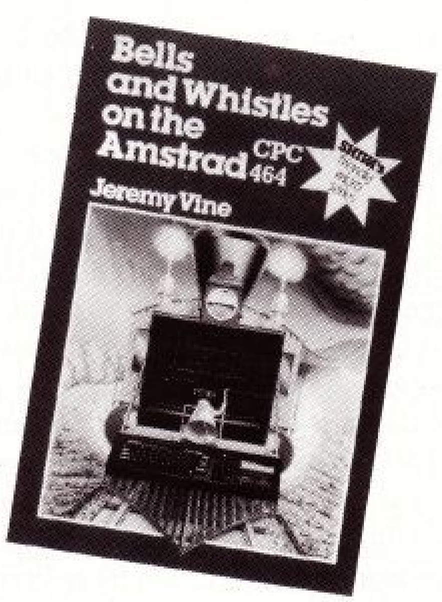
There is a tendency in many books on computer programming to skip over the sound capabilities with a brief nod to sirens and Space Invader bleeps. This is understandable: almost anyone can get to grips with graphics and produce pretty colours and shapes on the screen, but sound and music are much less intuitive, and the commands built into the Amstrad offer an almost infinite variety of possibilities. Besides, if you want to score a tune in three-part harmony you have to know music pretty thoroughly as well as how to program with the sound commands.

Jeremy Vine's book has been written to fill this gap. It deals with sound on the CPC464, with no disgressions.

Chapter 1 starts with the sort of fundamentals you're going to need to deal with sounds effectively: the meaning of amplitude, pitch and duration, and the three channels on the sound chip. The next chapter introduces the SOUND command, which can take a large number of parameters - the author begins with just two, the compulsory ones. Then each of the optional parameters is explained, bringing in the associated BASIC commands such as SQ.

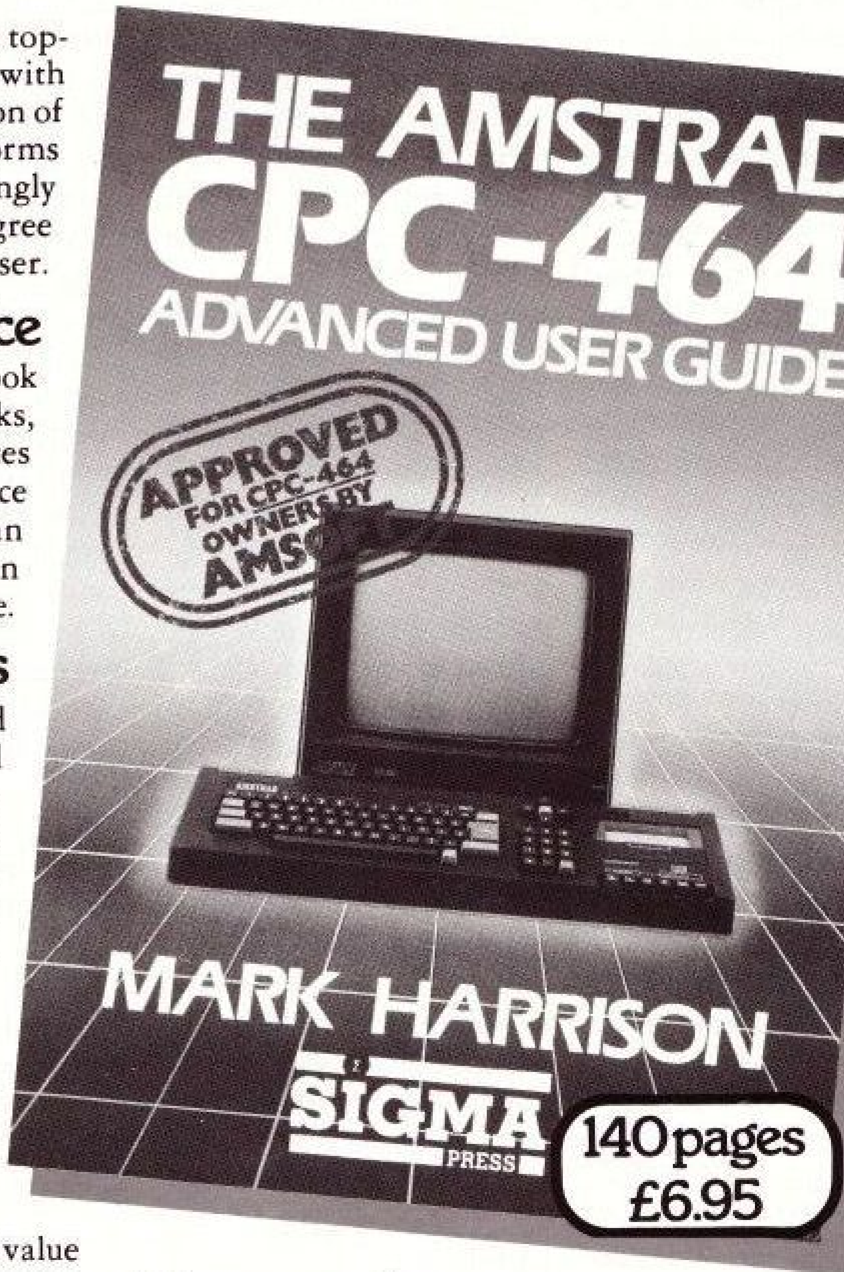
Next the concepts involved in music are dealt with, such as the stave and musical notation, which you will need if you want to transpose scores into the Amstrad (always remembering copyright, of course!). Finally (in the music section) the volume and tone envelopes are discussed.

Now comes the bit that all real programmers and interested in-the sound effects! Starting with a half-dozen throw away effects programs, the author goes on to provide a program that lets you generate different envelopes and test their effects, and touches on percussion (!). This is followed by an amazingly simple synthesiser program that you play from the keyboard. The book ends on a slightly disappointing note -- no pun intended -- with the usual obligatory copying of the CPC 464 command list which you've already got in the User Guide, but given the rest of the book, I think the author can be forgiven. The style is light-hearted and easy to read, and though the price-per-page is a little bit high, this is a useful book for your collection.



"An essential companion to the CPC-464 complete with Amsoft approval"

The **Amstrad CPC-464 Advanced User Guide** by top-selling author Mark Harrison has been produced with help from Amsoft, the computer products division of Amstrad. As a result of this liaison the book conforms to Amsoft's presentation conventions and accordingly carries their 'seal of approval'. With such fine pedigree the Advanced User Guide is a must for every 464 user.



BASIC advice

Clearly and concisely organised throughout, the book opens with a description of how the 464 works, moving on to communication with external devices and a summary of BASIC. A comprehensive reference section is included enabling you to find an explanation of any BASIC command or keyword in the 464's repertoire.

Programming techniques

After getting to grips with BASIC you can proceed to the various programming techniques that will help you to get the most from your 464. The Advanced User Guide contains detailed chapters on Strings and Character Manipulation; Input/Output Techniques; Arithmetic; the Amstrad Memory Map; Time, Clocks and Interrupts; Data Structures; Data Processing; Amstrad Graphics; Sound and Synthesis.

Ready-to-run programs

You'll find no fewer than FORTY ready-to-run programs in the Advanced User Guide that demonstrate how the 464 works and illustrate useful programming techniques. The combined value of these alone far exceeds the cost of the book. Ranging in size they cover such topics as Code-breaking; Information Sorting; 3-D Graphics; Business Applications. There are also arcade-style space games and, most spectacular of all, a complete Sound Synthesiser program.

What Amsoft say

In the preface to the Advanced User Guide William Poel of Amsoft writes — " . . . we are particularly grateful to Mark Harrison for filling in most of the gaps that inevitably occurred in the original user handbook, as well as adding much to the general utility of the machine in the hands of the users . . . books such as this can do nothing but good for both the product and its users."

Amsoft clearly approve — we think that you will too.

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Screen Squashing

By Peter Green

In any home computer which is designed to be sold at a competitive price, it is necessary to make some compromises. For example, one problem is how to keep down the amount of RAM (Random Access Memory) dedicated to the screen display while still allowing a reasonable resolution and range of colours.

Understandably, engineers working in the cut-throat consumer market would rather use an off-the-shelf device, and the 6845 video display controller is the one employed in your CPC464.

Text is printed onto this 'pixel-mapped' screen by colouring pixels (in the foreground colour) in the right pattern for each particular letter. The patterns are stored in ROM (Read-Only Memory), or can be copied into RAM and altered to taste by using the SYMBOL command. For economy there is only one table of patterns, which is used to print text in any of the three modes.

The shape of the letters depends on the shape of the pixels: a rather less than satisfactory compromise. The letters are best in MODE 1, and thin but still readable in MODE 2, but in the 20-column MODE 0, text is fat, distorted and difficult to make out. Worse, you can fit in less than half the text you could manage in MODE 1, because the 'narrower' screen makes it more likely that a word will break over the right-hand edge and need to start on the next line.

The ability to re-define the character set suggests a solution: alter the letter patterns, making them thinner so that they appear normal on a MODE 0 screen. This produces a new set of problems, however.

First, even if we make all the letters thinner, they will still be printed on the normal text spacing of eight-pixel cells, so we get bigger gaps between each letter. Second, we can't make all the letters the same width. Letters like A and T look best in MODE 0 when they are three pixels wide (actually, this is the minimum they could be). But what about M,W and @? A little thought should show you that these need to be wider to look sensible.

Both of these problems can be solved by printing the new characters at the graphics cursor, using the TAG option. The graphics cursor is advanced by eight pixels when it prints each letter, just like the text cursor, but we can move it back a little by using the relative move facility. And by keeping a table of widths for each letter that we've redefined, the cursor can be moved back by a different amount for each letter, so each character can be made its optimum width. This gives a true proportional spacing facility.

Selecting your PEN and PAPER colours is a bit tricky because the TAG facility means you are using the graphics foreground and background inks. To change these from BASIC needs cunning. Normally you must PLOT or DRAW something to change the foreground colour, but PLOTting a pixel outside the graphics window lets you do this without affecting the screen.

The background colour is more difficult, because BASIC requires you to execute a CLG to change colour, which would wipe everything else. Listing 1 is a small subroutine to change graphics colours non-destructively: set fc and bc to the foreground and background colours required, then GOSUB 1000 (or whatever). It works by testing the single pixel at bottom left, setting the graphics window to the two lower left pixels only (its smallest possible size), doing a CLG and then writing back the original colour over the two pixels before resetting the graphics window to the whole screen.

Listing 1

```
1000 ORIGIN 0,0,0,7,1,0:oldcol=TEST(0,0)
     :CLG bc:DRAWR 4,0,oldcol:ORIGIN 0,0
     ,0,639,399,0:PLOT -8,-8,fc:RETURN
```

Obviously the LOCATE command is useless; you have to position the graphics cursor explicitly at the start of each print string using MOVE. And you can't rely on the automatic wrapping of long text onto the next line, in the way that the text streams do. The machine will happily continue to dump characters into the void on the right-hand side of your video monitor until you tell it to move the graphics cursor back onto the screen. Since the text is proportional, a simple character count isn't a good guide to whether the string is too long to fit on the screen - if in doubt, test it and split it where necessary (see my first example program).

Finally, any control codes embedded in print strings will appear as their graphics equivalents, as usual for the TAG mode. The example shows the effect this can have. In particular, you must put a semi-colon after every string to prevent the giant Carriage Return/Line Feed arrows being printed.

At Last, The Program

As described, it would be easy to write a proportional print routine in BASIC by storing the character widths in an array and using the MOVER command. However, this would be rather slow, so I went for a machine code solution.

The Centronics printer routines in BASIC pass through the jumpblock, so my program patches the MC PRINT CHAR entry (which would normally try to send a character to the Centronics port) so that it points to my machine code (source code given in Listing 2). Any text to be printed proportionally should be PRINTed on text stream #8, and is automatically passed to my routine.

Because of the way extension ROMs can reserve sections of RAM for their workspace, it is good practice to make machine code that is to be stored above HIMEM (after a suitable MEMORY command) relocatable. Hence it doesn't matter where the object code from Listing 2 is assembled. The

Listing 2

```
Hisoft GENA3.1 Assembler. Page      1.
Pass 1 errors: 00
2EE9  210000    100 NEWSYM: LD   HL,0      ;Load start of data.
2EEC  110000    110         LD   DE,0      ;Load symbol table base.
2EEF  010003    120         LD   BC,768    ;Load length of data.
2EF2  EDB0      130         LDIR           ;Transfer the data.
2EF4  C9        140         RET            ;Go back to BASIC.
BBFC            150 GRAWRI: EQU  #BBFC     ;GRA WR CHAR
BBC3            160 GRAMOV: EQU  #BBC3     ;GRA MOVE RELATIVE
2EF5  C5        170 PRPTXT: PUSH BC        ;Save registers to meet
2EF6  D5        180         PUSH DE        ;exit conditions for the
2EF7  E5        190         PUSH HL        ;MC PRINT CHAR routine.
2EF8  F5        200         PUSH AF        ;Save character.
2EF9  CDFCBB    210         CALL GRAWRI    ;Print character at the
2EFC            220                        ;graphics cursor.
2EFC  F1        230         POP  AF        ;Get the character.
2EFD  CB7F      240         BIT  7,A       ;Test for upper limit.
2EFF  2013      250         JR   NZ,EXIT   ;Quit if more than 127.
2F01  D620      260         SUB  32        ;Test for lower limit.
2F03  380F      270         JR   C,EXIT    ;Quit if less than 32.
2F05  1600      280         LD   D,0       ;Load DE register pair
2F07  5F        290         LD   E,A       ;with ASCII code to use
2F08            300                        ;as offset into table.
2F08  21192F    310         LD   HL,BASE   ;Load HL registers with
2F0B            320                        ;table start.
2F0B  19        330         ADD  HL,DE     ;Add to get address of
2F0C            340                        ;required pointer.
2F0C  6E        350         LD   L,(HL)    ;Get low byte of x
2F0D            360                        ;offset from table.
2F0D  26FF      370         LD   H,#FF     ;Load high byte of
2F0F            380                        ;offset (always FF).
2F0F  5A        390         LD   E,D       ;Make DE register pair
2F10            400                        ;zero (y offset).
2F10  EB        410         EX   DE,HL     ;Swap x,y offsets into
2F11            420                        ;the right registers.
2F11  CDC3BB    430         CALL GRAMOV    ;Move graphics cursor.
2F14  E1        440 EXIT:   POP  HL        ;Restore registers and
2F15  D1        450         POP  DE        ;set the carry as
2F16  C1        460         POP  BC        ;required for the right
2F17  37        470         SCF            ;exit conditions.
2F18  C9        480         RET            ;Quit routine.
2F19            490 BASE:   DEFS 96        ;Start of look-up table.
Pass 2 errors: 00
Table used:   161  from   256
```

three absolute addresses which will need changing (in lines 100,110 and 310) can be altered from BASIC by POKEing after the machine code has been loaded to a forced address by the application program.

Lines 100-140 of Listing 2 have nothing to do with the printing routine; they simply use the Z80 block move instruction to copy the modified character set into the normal symbol table. This lets you use both character sets in the same program (you get the normal set back by using SYMBOL AFTER 32).

The routine proper starts at line 170, at the label PRPTXT. When intercepting jumpblock entries, it is vital to not to corrupt any registers that the original routine would have preserved: we'll be using BC, DE and HL, so lines 170-190 save these values on the stack. We know from the MC PRINT CHAR entry conditions that A contains the character to print, so we save that on the stack too (GR WR CHAR corrupts A) and call the firmware routine to print the character at the graphics cursor (lines 200-210).

Then we pop the character back off the stack and check whether it lies inside our 'proportional' range, which I decided would be the entire printable ASCII set from 32 to 127. For the upper limit it's only necessary to test bit 7, which must be set if the ASCII code is greater than 127. If it is, then the character is a block graphic and we mustn't backspace, jumping instead to the exit routine.

In line 260 the lower limit is checked, using SUB 32 instead of CP 32 because it lets us use the new contents of the A register as an index into the look-up table. If the character is proportional, lines 280-330 calculate the address of the table entry for the character's width. This requires a 16-bit addition. The index is copied into DE (D will always be 0) and added to the table base address in HL. The contents of the byte addressed by HL is copied into L, and forms the low byte of the signed 16-bit number that the GR MOVE RELATIVE routine requires as an X-displacement. The high byte is always &FF because the displacement is never more than -6 pixels (-24 co-ordinate points in MODE 0), which is a small negative number.

The vertical displacement is 0, so we make DE zero in line 390. Now we need the X-displacement in DE and the Y- displacement in HL, so line 410 swaps them over. Why do it this way, rather than loading the offset from the table into E, setting D to &FF and loading HL with 00? Well, register swaps and loads are single-byte op codes, so I've saved a byte. If that seems fussy, I'm a great believer in paring code to the bare bones: efficient programming is a good habit for when you tackle those really big jobs.

Now we can call the firmware routine to move the graphics cursor relative to its current position (line 430). That completes the processing for this character, so all that remains is to pop the registers we saved on the stack, set the carry flag to con the firmware into thinking our Centronics' routine has sent the character to the printer successfully, and exit. Using an assembler or the hex loader, enter the machine code into the Amstrad at any convenient point in memory and save it to tape or disc under the filename 'PRPTXT.OBJ'. Then reset your machine and enter the horrendous Listing 3. This simply uses the SYMBOL statements to redefine the new characters, appends the object code you've just saved onto the end of the symbol table (after ASCII 127, that is), and follows that with the low bytes of the backspace displacements. The whole lot is then saved back onto tape or disc under the filename 'PROPCODE.BIN', which is a 912-byte block of binary code consisting of 768 bytes of symbol data (8 times 96), the 12 bytes to shift that into the symbol table, the 36 bytes of the proportional printer routine and the 96 bytes of width data.

This program produces the best-looking text I could manage in MODE 0: feel free to change any characters you don't like. The width data should be the number of pixels across the character not including the separating space to the next letter. This one-pixel gap is taken care of by the use of 7 instead of 8 in line 2020 of Listing 3. This line also has a multiply-by-four factor because in MODE 0, one pixel width is four co-ordinate points.

Using The Code

Listing 4 is an example program which shows how to put the proportional space routine to work. It allows you to swap freely between

```
1113 SYMBOL 113,0,0,96,160,160,96,32,48:DATA 3
1114 SYMBOL 114,0,0,64,160,128,128,128,0 :DATA 3
1115 SYMBOL 115,0,0,96,128,224,32,192,0:DATA 3
1116 SYMBOL 116,64,64,224,64,64,64,96,0:DATA 3
1117 SYMBOL 117,0,0,160,160,160,160,96,0 :DATA 3
1118 SYMBOL 118,0,0,160,160,160,160,64,0 :DATA 3
1119 SYMBOL 119,0,0,136,136,168,248,80,0 :DATA 5
1120 SYMBOL 120,0,0,160,160,64,160,160,0 :DATA 3
1121 SYMBOL 121,0,0,160,160,160,96,32,19 2:DATA 4
1122 SYMBOL 122,0,0,224,32,64,128,224,0:DATA 3
1123 SYMBOL 123,32,64,64,128,64,64,32,0:DATA 3
1124 SYMBOL 124,128,128,128,128,128,128,128,0:DATA 1
1125 SYMBOL 125,128,64,64,32,64,64,128,0 :DATA 3
1126 SYMBOL 126,80,160,0,0,0,0,0,0:DATA 4
1127 SYMBOL 127,160,80,160,80,160,80,160,80:DATA 3
2000 LOAD"PRPTXT.OBJ",code
2010 FOR char=0 TO 95
2020 READ w:w=4*(7-w):POKE base+char,256 -w
2030 NEXT
2040 SAVE"PROPCODE.BIN",B,start,912
2050 SYMBOL AFTER 32:END
```

the normal and proportional character sets. The symbol table is deleted from RAM, HIMEM moved down by 912 bytes and the code loaded above it. (CLOSEIN reclaims the input buffer which BASIC leaves open after loading binary files).

All the absolute addresses are converted into low-byte, high-byte address pairs (calculated from the known value of HIMEM and the various offsets from the start of the code) and POKEd into place. The jumpblock entry at &BD2B-&BD2D is altered to jump to the new code (line 190), and the variable newsym holds the address of the code to copy the new data down into the symbol table. CALLing newsym selects the thin characters, therefore: a SYMBOL AFTER 32 will restore the Amstrad's own character set.

The rest of Listing 4 displays the entire new character set, and some sample sentences in both typefaces. Note that the lengths of the strings printed in lines 220-240 and 270-280 were decided by trial and error, for the reasons described earlier. Finally lines 290 and 300 show the difference between sending control characters to the graphics and text cursors. Line 290 generates graphic symbols, while line 300 obeys the CHR$(30) and moves the text cursor to home (incidentally this also shows the thin characters on an eight-pixel spacing).

It is very important to execute WIDTH 255 before using the proportional printing routine, to tell BASIC that the printer' has an 'infinite' width. Otherwise it will insist on sending Carriage Return/Line Feed at regular intervals, which will, of course, appear on the screen.

If your application program requires the use of the printer port as well, the printer jumpblock can be restored to normal when necessary by CALL &BD37.

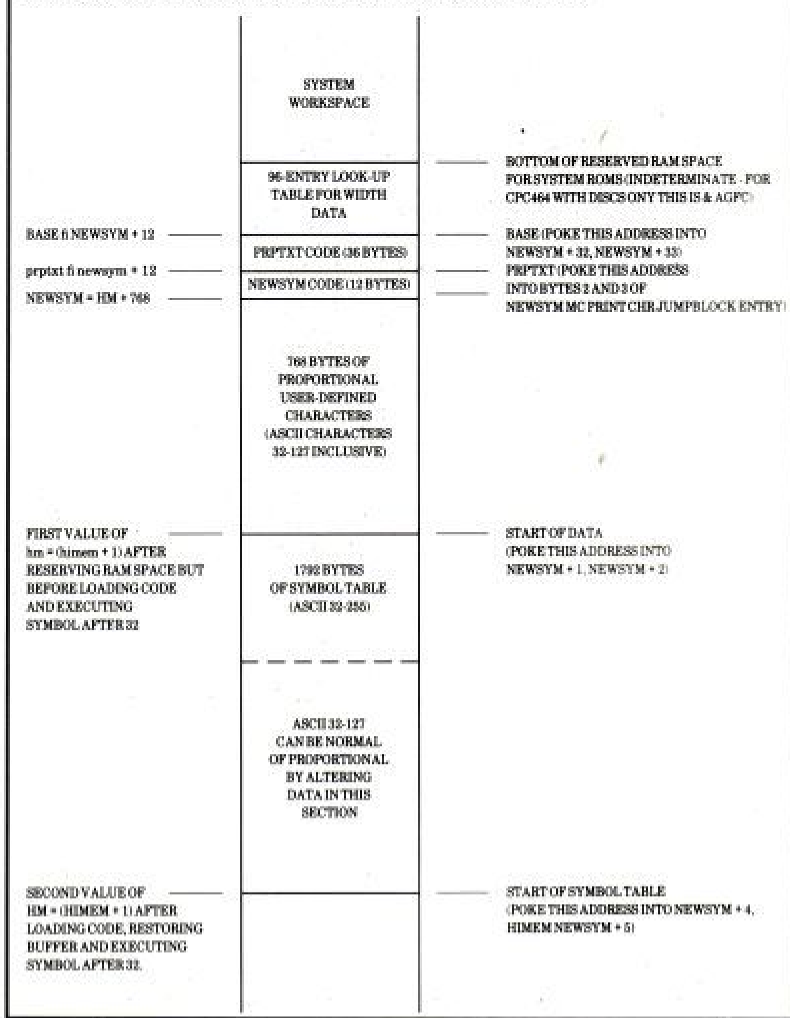
After using the printer, proportional printing can be accessed again by replacing the jumpblock patch: execute the BASIC in line 190 to do this.

Have fun!

Listing 4

```
100 WIDTH 255
110 SYMBOL AFTER 256
120 MEMORY HIMEM-912
130 hm=HIMEM+1:newsym=hm+768
140 LOAD"PROPCODE.BIN",hm:CLOSEIN
150 POKE newsym+1,UNT(hm) AND &FF:POKE n
    ewsym+2,INT(hm/256)
160 SYMBOL AFTER 32:hm=HIMEM+1
170 POKE newsym+4,UNT(hm) AND &FF:POKE n
    ewsym+5,INT(hm/256)
180 POKE newsym+32,UNT(newsym+48) AND &F
    F:POKE newsym+33,INT((newsym+48)/256
    )
190 POKE &BD2B,&C3:POKE &BD2C,UNT(newsym
    +12) AND &FF:POKE &BD2D,INT((newsym+
    12)/256)
200 CALL newsym
210 MODE 0
220 MOVE 0,300:FOR i=32 TO 73:PRINT#8,CH
    R$(i);:NEXT
230 MOVE 0,250:FOR i=74 TO 112:PRINT#8,C
    HR$(i);:NEXT
240 MOVE 0,200:FOR i=113 TO 127:PRINT#8,
    CHR$(i);:NEXT
250 SYMBOL AFTER 32:LOCATE 1,16:PRINT"Th
    is is normal."
260 CALL newsym
270 MOVE 0,80:PRINT#8,"A quick demo of p
    roportional spacing on the";
280 MOVE 0,64:PRINT#8,"Amstrad CPC464 in
     Mode 0.";
290 MOVE 0,16:PRINT#8,CHR$(30);"Finished
    !"
300 PRINT CHR$(30);"Finished!"
310 SYMBOL AFTER 32
320 END
```

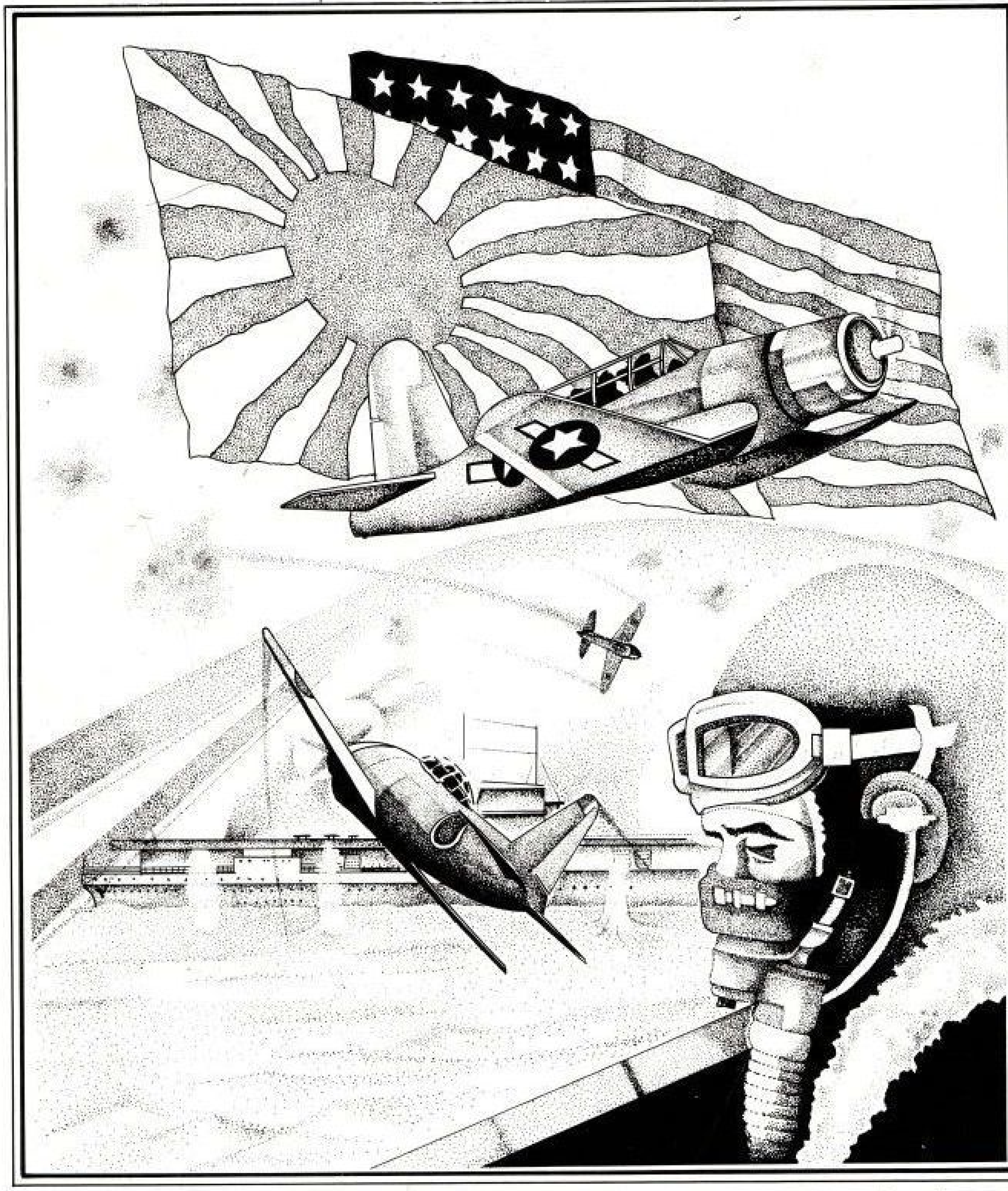
FIG 1. STORE MAP FOR CPC464 USER PROPORTIONAL SPACING



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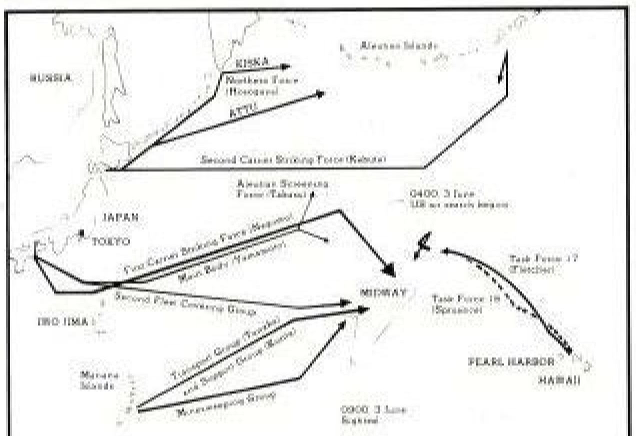
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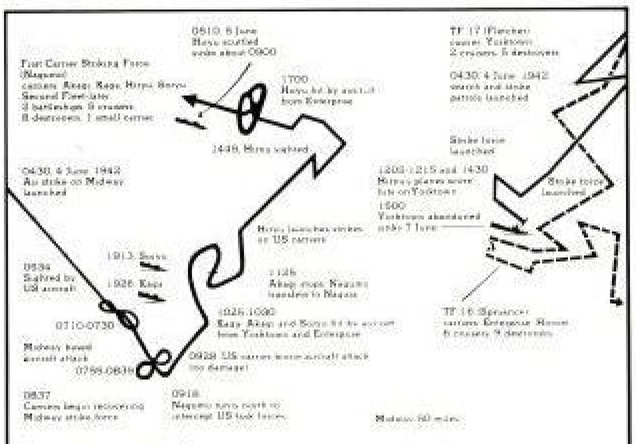
THE AUTHOR
Alan Steel is one of the original UK wargamers and has been playing and designing wargames for nearly twentyfive years.

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Machine Code Hex Dump

```
8000  21 00 00 11 00 00 01 00 33
8008  03 ED B0 C9 C5 D5 E5 F5 DD
8010  CD FC BB F1 CB 7F 20 13 F2
8018  D6 20 38 0F 16 00 5F 21 D3
8020  31 2B 19 6E 26 FF 5A EB 4D
```

Hex Loader

```
10 REM            *-----------------*
20 REM            *  hex loader     *
30 REM            *-----------------*
40 MODE 2
50 GOSUB 270
60 INPUT "Load address :",addr
70 lin$=""
80 WHILE lin$<>"END"
90  PRINT HEX$(addr,4);":";:LINE INPUT l
   in$
100  lin$=UPPER$(lin$)
110  chk=0:oldaddr=addr
120  FOR a=1 TO LEN(lin$) STEP 3
130   m$=MID$(lin$,a,1)
140   l$=MID$(lin$,(a+1),1)
150   m=ASC(m$)
160   l=ASC(l$)
170  IF m>&2F AND m<&3A THEN m=m-&30 ELS
   E IF m>&40 AND m<&47 THEN m=m-&37 EL
   SE PRINT "error",m$
180  IF l>&2F AND l<&3A THEN l=l-&30 ELS
   E IF l>&40 AND l<&47 THEN l=l-&37 EL
   SE PRINT "error",l$
190  byt=m*16+l
200  IF a=LEN(lin$)-1 THEN GOTO 240
210  chk=(chk+byt) MOD 256
220  POKE addr,byt
230  addr=addr+1
240  NEXT a
250  IF chk<>byt THEN PRINT "Checksum Er
   ror - retype line":a=LEN(lin$):addr=
   oldaddr
260 WEND
270 '*-----------------------------------
   ----------*
280 '*  Instructions - can be omitted, j
   ust put   *
290 '*  560 RETURN
             *
300 '*-----------------------------------
   ----------*
310 PRINT,"        Machine code loader"
320 PRINT,"        ======= ==== ======"
330 PRINT
340 PRINT"When asked, input address at w
   hich to start loading the code"
350 PRINT"this is taken as a decimal val
   ue - to use hex, prefix with &."
360 PRINT
370 PRINT"Then enter lines of bytes, eac
   h separated by a space, the final"
380 PRINT"one being the checksum for tha
   t line."
390 PRINT
400 PRINT"example:-"
410 PRINT
420 PRINT"load address:&8000"
430 PRINT"8000:01 02 03 04 0A       (wher
   e 0A is the checksum)"
440 PRINT"8004: etc."
450 PRINT
460 PRINT"If an error occurs, 'Checksum
   Error - retype line' will be printed
   "
470 PRINT
480 PRINT "example:-"
490 PRINT
500 PRINT"8000:01 02 03 04 01 01 01 37"
510 PRINT"Checksum Error - retype line"
520 PRINT"8000:01 02 03 04 01 01 01 0D"
530 PRINT"8007: etc."
540 PRINT
550 RETURN
```

Listing 3

```
1000 SYMBOL AFTER 32
1010 start=HIMEM+1:code=start+768:base=c ode+48
1032 SYMBOL 32,0,0,0,0,0,0,0,0:DATA 2
1033 SYMBOL 33,128,128,128,128,128,0,128,0:DATA 1
1034 SYMBOL 34,160,160,160,0,0,0,0,0:DAT A 3
1035 SYMBOL 35,96,96,240,96,240,96,96,0:DATA 4
1036 SYMBOL 36,64,224,192,224,96,224,64,0:DATA 3
1037 SYMBOL 37,160,160,32,64,128,160,160,0:DATA 3
1038 SYMBOL 38,64,160,160,64,176,160,80,0:DATA 4
1039 SYMBOL 39,64,64,128,0,0,0,0,0:DATA 2
1040 SYMBOL 40,64,128,128,128,128,128,64,0:DATA 2
1041 SYMBOL 41,128,64,64,64,64,64,128,0:DATA 2
1042 SYMBOL 42,0,144,96,240,96,144,0,0:D ATA 4
1043 SYMBOL 43,0,0,64,64,224,64,64,0:DAT A 3
1044 SYMBOL 44,0,0,0,0,0,64,64,128:DATA 2
1045 SYMBOL 45,0,0,0,0,224,0,0,0:DATA 3
1046 SYMBOL 46,0,0,0,0,0,128,128,0:DATA 1
1047 SYMBOL 47,32,32,64,64,64,128,128,0:DATA 3
1048 SYMBOL 48,96,144,176,240,208,144,96,0:DATA 4
1049 SYMBOL 49,64,192,64,64,64,64,224,0:DATA 3
1050 SYMBOL 50,64,160,32,96,128,128,224,0:DATA 3
1051 SYMBOL 51,64,160,32,64,32,160,64,0:DATA 3
1052 SYMBOL 52,32,32,64,64,160,224,32,0:DATA 3
1053 SYMBOL 53,224,128,192,32,32,160,64,0:DATA 3
1054 SYMBOL 54,64,160,128,192,160,160,64,0:DATA 3
1055 SYMBOL 55,224,32,32,64,64,64,64,0:D ATA 3
1056 SYMBOL 56,64,160,160,64,160,160,64,0:DATA 3
1057 SYMBOL 57,64,160,160,96,32,160,64,0 :DATA 3
1058 SYMBOL 58,0,0,128,128,0,128,128,0:D ATA 1
1059 SYMBOL 59,0,0,64,64,0,64,64,128:DAT A 2
1060 SYMBOL 60,0,32,64,128,64,32,0,0:DAT A 3
1061 SYMBOL 61,0,0,0,224,0,224,0,0:DATA 3
1062 SYMBOL 62,0,128,64,32,64,128,0,0:DA TA 3
1063 SYMBOL 63,64,160,32,96,64,0,64,0:DA TA 4
1064 SYMBOL 64,96,144,176,176,176,128,11 2,0:DATA 4
1065 SYMBOL 65,64,224,160,160,224,160,16 0,0:DATA 3
1066 SYMBOL 66,192,160,160,192,160,160,1 92,0:DATA 3
1067 SYMBOL 67,64,160,128,128,128,160,64,0:DATA 3
1068 SYMBOL 68,192,160,160,160,160,160,1 92,0:DATA 3
1069 SYMBOL 69,224,128,128,192,128,128,2 24,0:DATA 3
1070 SYMBOL 70,224,128,128,192,128,128,1 28,0:DATA 3
1071 SYMBOL 71,64,160,128,128,160,160,96,0:DATA 3
1072 SYMBOL 72,160,160,160,224,160,160,1 60,0:DATA 3
1073 SYMBOL 73,128,128,128,128,128,128,1 28,0:DATA 1
1074 SYMBOL 74,96,32,32,32,32,160,64,0:D ATA 3
1075 SYMBOL 75,160,160,192,192,160,160,1 60,0:DATA 3
1076 SYMBOL 76,128,128,128,128,128,128,2 24,0:DATA 3
1077 SYMBOL 77,144,240,240,144,144,144,1 44,0:DATA 4
1078 SYMBOL 78,160,224,224,160,160,160,1 60,0:DATA 3
1079 SYMBOL 79,96,144,144,144,144,144,96,0:DATA 4
1080 SYMBOL 80,192,160,160,192,128,128,1 28,0:DATA 3
1081 SYMBOL 81,96,144,144,144,176,176,11 2,0:DATA 4
1082 SYMBOL 82,192,160,160,192,192,160,1 60,0:DATA 3
1083 SYMBOL 83,64,160,128,224,32,160,64,0:DATA 3
1084 SYMBOL 84,224,64,64,64,64,64,64,0:D ATA 3
1085 SYMBOL 85,160,160,160,160,160,160,2 24,0:DATA 3
1086 SYMBOL 86,160,160,160,160,160,224,6 4,0:DATA 3
1087 SYMBOL 87,136,136,136,168,168,248,8 0,0:DATA 5
1088 SYMBOL 88,160,160,64,64,64,160,160,0:DATA 3
1089 SYMBOL 89,160,160,160,64,64,64,64,0 :DATA 3
1090 SYMBOL 90,224,32,32,64,128,128,224,0:DATA 4
1091 SYMBOL 91,192,128,128,128,128,128,1 92,0:DATA 2
1092 SYMBOL 92,128,128,64,64,64,32,32,0:DATA 3
1093 SYMBOL 93,192,64,64,64,64,64,192,0:DATA 2
1094 SYMBOL 94,64,224,160,0,0,0,0,0:DATA 3
1095 SYMBOL 95,0,0,0,0,0,0,224,0:DATA 2
1096 SYMBOL 96,32,80,64,224,64,64,240,0:DATA 4
1097 SYMBOL 97,0,0,96,160,160,160,112,0:DATA 4
1098 SYMBOL 98,128,128,192,160,160,160,1 92,0:DATA 3
1099 SYMBOL 99,0,0,64,160,128,160,64,0:D ATA 3
1100 SYMBOL 100,32,32,96,160,160,160,96,0:DATA 3
1101 SYMBOL 101,0,0,64,160,224,128,96,0:DATA 3
1102 SYMBOL 102,64,160,128,192,128,128,1 28,0:DATA 3
1103 SYMBOL 103,0,0,96,160,160,96,32,192 :DATA 3
1104 SYMBOL 104,128,128,224,160,160,160,160,0:DATA 3
1105 SYMBOL 105,0,128,0,128,128,128,128,0:DATA 1
1106 SYMBOL 106,0,64,0,64,64,64,64,128:D ATA 2
1107 SYMBOL 107,128,128,160,192,192,160,160,0:DATA 3
1108 SYMBOL 108,128,128,128,128,128,128,128,0:DATA 1
1109 SYMBOL 109,0,0,80,168,168,136,136,0 :DATA 5
1110 SYMBOL 110,0,0,192,160,160,160,160,0:DATA 3
1111 SYMBOL 111,0,0,64,160,160,160,64,0:DATA 3
1112 SYMBOL 112,0,0,192,160,160,192,128,128:DATA 3
```

Printer Profile

The Dyneer DW16 £378.35 r.r.p.



With a printer there are many things to consider; price,noise level, print quality, speed and features. These factors tend to work against one another. A cheap printer is quite likely to produce poor quality print. The DW16 favours print quality. It may be fairly cheap for a daisy wheel printer, but it is very slow, the 16 in the name stands for an optimistic 16 characters per second. It is a quiet printer but it lacks many of the features which are now considered normal. In the bi-directional mode the printer is not capable of underlining or producing bold print. To use these features you need to flick one of the easily accessible switches and this results in the print speed being greatly reduced.

Despite the lack of insulation within the plastic case, the DW16 is very quiet, partly due to the low speed. This means that it is quite possible for you to print a letter and watch television in the same room. If only the same could be said for some dot matrix printers. The quality is good, using a multistrike carbon ribbon the text is well defined and clear. The ribbons are not cheap and the rate of consumption is high, so unless your main requirement is letter writing, this is not the printer for you. For producing listings the DW16 is too slow and expensive to run.

The paper feed is friction only, like a typewriter. This means that headed note paper can be used but has the drawback that it is difficult to use pre-printed computer stationery or a roll of labels. At this price one cannot be too fussy and the DW16 has proved over a time of several months to be a strong, reliable workhorse.

Amstrad DMP-1 £199.95 r.r.p.

Based on the Seikosha GP500, the DMP-1 is a reasonably fast dot matrix printer. However in order to favour the price, it lacks top quality and features, and is noisy. The image is produced by a 5 x 7 matrix of needles which plot out the characters. This scale means that there are no descenders, so the p's, q's and g's are not ideally formed.

Given that it is the official Amstrad printer I was disappointed to find that it was not capable of printing the entire character set. Commodore produce a version of the DMP-1, called the MPS801 and this is capable of producing the entire Commodore 64 character set (which isn't too exciting, nevertheless).

The ribbon is of the non-messy cartridge type. It uses a small endless loop of fabric which is kept inked by a felt-pad device. This works well when the ribbon is new but soon fades to a mediocre level and then takes a while to drop off until it is bad enough to need replacing. It can prove very difficult to buy a ribbon locally, so a stock is a worthwhile investment.



However at only £199.95 including the printer connecting lead, there is not much scope for complaint. The DMP-1 is OK for listings and will produce an adequate screen dump, but it is not up to near letter quality use. The tractor feed ensures accurate paper alignment, and is stronger than most - but the DMP-1 has stiff competition these days.

Brother M-1009 £199.95 r.r.p.

The Brother M-1009 is a smart looking impact dot-matrix printer, quieter than some and printing at 50 c.p.s. Friction feed and a Centronics interface are supplied as standard, with tractor feed and an RS-232 interface available as optional extras.

I liked the look of the printer, it is very neat and compact, measuring 330mm x 190mm x 70mm, slightly larger than a page of this magazine, and so will easily fit in a brief-case for transportation between home and work.

The only minor niggle is the position of the On/Off switch. This is on the lower front edge, and is easily knocked into the *off* position by manuals or program books. Conversely, the internal DIP switches which select various functions such as page length and international character sets are accessible by

removing the lid and delving into the bowels with a blunt instrument. You don't have to dismantle the machine, let alone remove the paper to get to them.

The user manual is about par for the course, a quaint blend of English words and Japanese grammar. There are plenty of examples to show off the features of the machine, slight changes are needed to make the examples work on the Arnold. e.g:.
PRINT#8,CHR$(15) *instead of* LPRINT CHR$(15)
to switch on the condensed print mode.



The Brother is very good value for the price, including many Epson type features: four international character sets (English, American, French and German), four typefaces (Pica, Elite, Condensed and Italic) which can be enlarged or emphasised, also underlining, super and subscripts and graphic printing modes (for screen dumps) are supported.

A PL-1 printer lead will be needed to connect the printer to the Arnold. The lead to pin 14 needs to be cut in the time honoured Amsoft fashion, to stop extra line feeds being sent to the printer. All in all very good value for money in a reasonable, light application.

Kaga/Taxan KP810 £299.99 r.r.p.

As far as the home computer field is concerned, there is only one way to split the printer market -Epson-compatibles and the rest. Epson were the leaders with their range of cheap and versatile dot matrix printers, and the Epson FX-80 established the industry standard at this level.

As with any other product which achieves such a market dominance, other manufacturers decided that the best course was to make their printers Epson-compatible, and if they could add extra features at a lower price, so much the better.

With their Taxan range, Kaga Electronics have succeeded magnificently. The KP-810 is functionally equivalent to an Epson FX-80, and obeys all of the standard Epson control codes. Its standard typeface is identical to the Epson, too. It is neatly styled and robustly built, with clean lines to its cream plastic casing, and the controls are all easily accessible (except the on/off switch, which is placed around the right-hand side to prevent any accidental knocks).

The tractor feed mechanism is easier to load (the paper pin holes drop onto the tractor sprockets, as opposed to trickier printers which require you to feed fanfold paper under the sprockets), yet a current advert shows a computer dealer selling the KP-810 for £242, while the FX-80 costs £316 from the same source (both prices exclude VAT and postage).

If this was all there was to the Kaga, it would be a good buy. But there are a number of additional features which make it unbeatable value for money. On the hardware front the KP-810 offers a built-in 3K buffer and an adjustable width tractor feed to cope with most widths of paper. The buffer means that short pieces of text can be dumped quickly into the printer, letting you get on with other tasks at the computer while the printer churns out the text at its slower rate. (The advantage of a buffer is reduced with larger amounts of text because the buffer is full for most of the printing cycle).

The other exciting extra is the inclusion of a Near Letter Quality (NLQ) typeface. This can be selected using a control code sequence from the computer, whereupon all printing takes place at half the speed but in a very stylish font quite different from the normal boring dot matrix look. NLQ is a waste of time for listings, but gives correspondence a very classy appearance. It's possible to obtain extra ROMs for the Kaga which provide alternative fonts, or you can add 8K of RAM so that a number of user-defined fonts can be downloaded from your computer.



Nice though the Kaga printer is, I do have one major criticism that concerns the placing of the DIP switches which control the various control modes and allow you to customise things like start-up font and buffer size.

On the Epson printers these are readily accessible under a small panel on the top of the casing. The Kaga's design means you have to practically dismantle it to get at the switches! It's necessary to pull out the paper feed knob, remove the ribbon cartridge, undo several screws at the front and rear panels and take off the whole top cover. This is plain daft! Nevertheless, taken overall the Kaga KP-810 is nothing less than an excellent buy. Recommended.

CENTRE COURT

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AMSTRAD CPC464

Serve yourself another ace from Amsoft!

The Joy of Sticks

A good joystick is a must for those of you considering spending long hours hammering at the CPC464 playing arcade games. As the most immediate connection with any game that you play, it is worth taking the time and trouble in choosing the 'right' one for you. They come in many shapes and sizes and faced with a large selection, the task of choosing just one can be rather daunting. So for this reason we have put a number to the test with the CPC464 together with some of our toughest games.

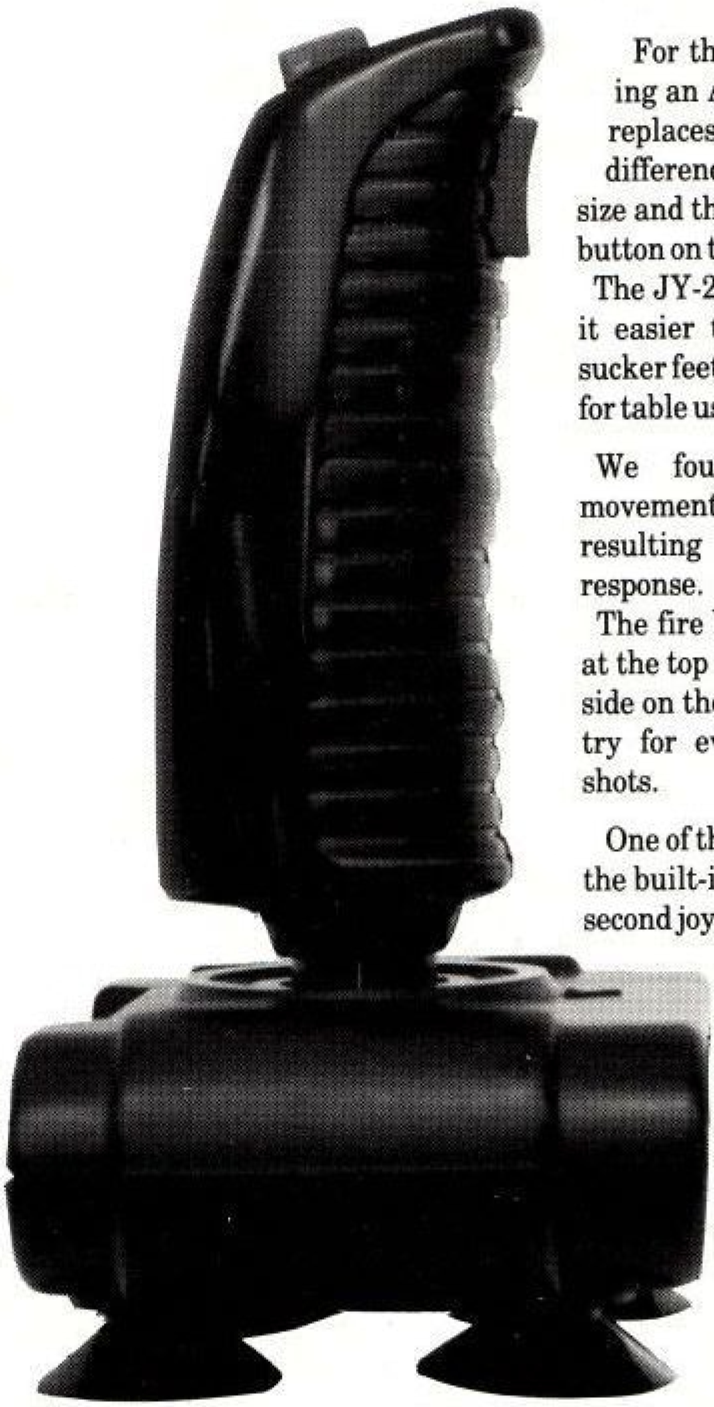
So what type of joystick is compatible with the CPC464? Almost any joystick with a standard 9 pin D connector is the answer to that, but of course there are always exceptions to any rule. The joystick port on the CPC464 is located on the left hand side at the back of the computer so having chosen the most suitable one for you, just plug it in and keep your fingers crossed that you have chosen the best possible weapon against those ever increasing invaders.

We tested our joysticks with a good tough and lively game; after all, the main objective of using any joystick is to obtain increased speed and accuracy when trying to shoot down stubborn aliens! A joystick must also be robust, and nothing is more frustrating in finding that the stalk of your faithful, old (and sometimes new!) joystick has just snapped off whilst in the middle of a particularly hectic chase around the screen... Maybe even more frustrating to a connoisseur games player is a consistently sluggish firing button, that refuses to acknowledge your efforts however persistent.

So what exactly do you look for when trying to find the perfect joystick? It is a matter of personal preference as far as the shape of the handle is concerned. Some users prefer to have a stalk with round ball attached, some prefer a more conventional moulded hand grip whilst others prefer to choose from the many other shapes available.

The most important considerations to take into account though are the speed and response of the fire button, the sensitivity of the stalk, durability and the general feel of the joystick when in use.

We are pleased to report that all of the joysticks reviewed ahead managed to hold up quite well against the excessive battering that they were given.



They demonstrate a fair representation of the types and varieties that are currently available and should give you a good idea of the kind of performance you can expect to obtain from the average joystick.

Anyhow for more details, read on....

Amstrad JY-2

Supplier: AMSOFT
Brentwood House,
169 Kings Road,
Brentwood, Essex.

Price	£14.95
Cable Length (ft)	4 1/2
No. of Fire Buttons	2

For those of you considering buying an AMSOFT joystick. The JY-2 replaces the existing JY-1. The main difference between the two being the size and the addition of a second firing button on the new 'stick.

The JY-2 has a smaller base making it easier to hand hold and the four sucker feet on the base make it suitable for table use too.

We found that the restrictive movement of the grip was a bonus resulting in a sharp and positive response.

The fire buttons are well placed both at the top of the handle grip and at the side on the front, making it possible to try for even those most difficult of shots.

One of the best features of the JY-2 is the built-in socket for the addition of a second joystick. This feature was made popular by the JY-1 and it seemed appropriate to offer the facility for the second time around. On the whole, the JY-2 is a good all-rounder though perhaps a little expensive and not quite as robust as some of the other joysticks.

Speed of Response	***
Durability	***
Ease of Use	***
Value For Money	****

Wico Red Ball

Supplier: CGL, CGL House,
Goldings Hill, Loughton, Essex.

Price	£24.95
Cable Length (ft)	5
No. of Fire Buttons	2

As its name suggests this is a joystick with an arcade-style red ball handle grip mounted upon a long steel shaft. It has a solid and heavy base if rather large, making it more suitable for table use rather than hand held. There are two firing buttons one on the top of the handle for thumb operation and one on the base for use with the other hand. A thumb activated lever switch on the base, allows the user to select which of the fire buttons he requires to use. This can get quite confusing if two players alternate at playing a game.

The joystick reacted well to the tests that we put it through, although it was considered that the steel lever was rather springy and the ball handle grip difficult to hold in preference to a straight stick type. Sensitivity was good though, which was confirmed by the high scores we managed to obtain...

As this joystick is solidly constructed it should withstand many hours of use.

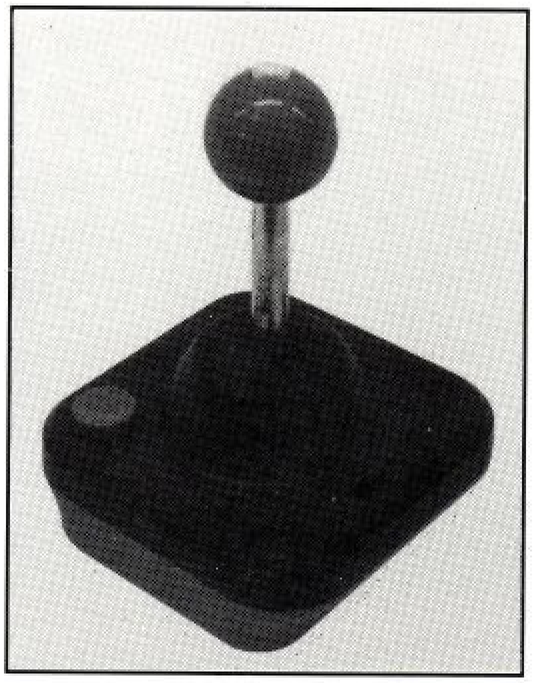
Speed of Response	****
Durability	****
Ease of Use	***
Value For Money	***

Wico - The Boss

Supplier: CGL, CGL House,
Goldings Hill, Loughton, Essex

Price	£14.95
Cable Length (ft)	5
No. of Fire Buttons	1

From the same manufacturer as the 'Red Ball' and the 'Three Way Deluxe', this a cheaper version with only one fire button located at the top of the handle. It has a slighty smaller and lighter base than the others, but even so, more suited for table use, unless of course you have exceptionally large hands! The handle grip is comfortable if sited on a slightly wobbly stalk that rotates freely for those most difficult of shots.



Wico Red Ball

We found that the joystick reacted well and had good rapid firing capabilities. Considering that this was one of the cheaper joysticks that we tested, it performed well and was considered to be good value for money. (My favourite -Ed.)

Speed of Response	****
Durability	****
Ease of Use	***
Value for Money	****

Wico Three Way Deluxe

Supplier: CGL, CGL House,
Goldings Hill, Loughton, Essex

Price	£27.95
Cable Length (ft)	5
No. of Fire Buttons	2

Although similar in design to the Wico Red Ball, this joystick comes complete with 3 interchangeable grips which can be easily transferred off and on the steel shaft. Having received the joystick for review we found it fun just to try out all the possibilities!

The base is the same as that for the Red Ball, making the joystick rather heavy but sturdy when placed on a table top. Certainly ideal for the user who prefers to play at a table. There are two firing buttons, one located on the top of each of the handles, and one on the left-hand side of the base. A base mounted slide switch activates the fire buttons enabling the user to choose



The Boss

between the fire button on the handle activated on its own, or as an added feature, both of the fire buttons activated together This feature is perfect for those games which require an extra fast response.

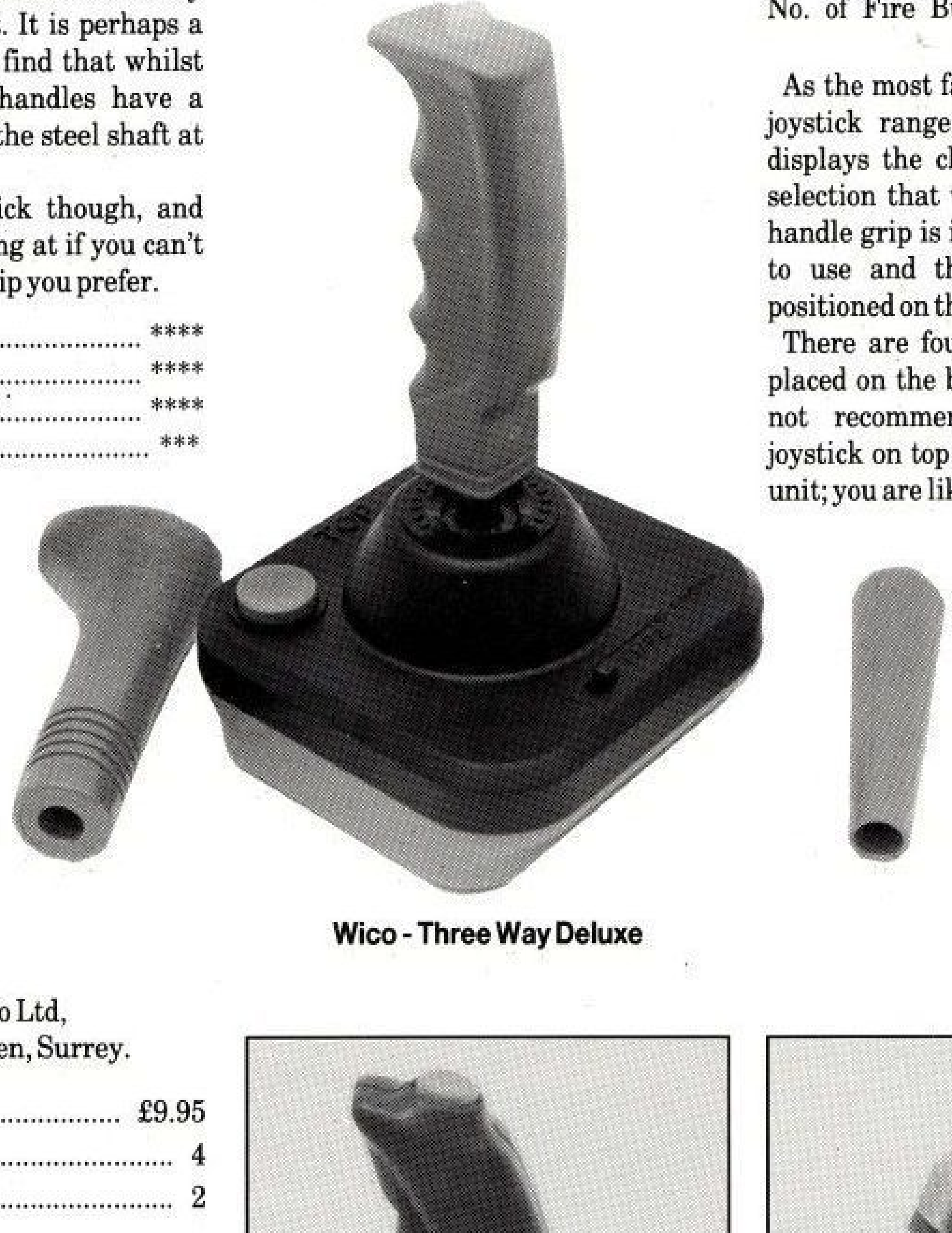
We liked the idea of interchangeable handles and found that sensitivity wasn't lost as a result. It is perhaps a little disconcerting to find that whilst in use, each of the handles have a tendency to rotate on the steel shaft at a moment's notice.

A good robust joystick though, and definitely worth looking at if you can't decide which type of grip you prefer.

Speed of Response	****
Durability	****
Ease of Use	****
Value For Money	***

joystick all the same. Well worth looking at for the price.

Speed of Response	***
Durability	**
Ease of Use	***
Value for Money	***



Wico - Three Way Deluxe

Quickshot II

Supplier : Spectravideo Ltd,
165 Garth Road, Morden, Surrey.

Price	£12.95
Cable Length (ft)	4
No. of Fire Buttons	2

As the most famous of the Quickshot joystick range, this joystick proudly displays the chunkiest handle of the selection that we tested. Even so, the handle grip is in fact very comfortable to use and the firing buttons well positioned on the top of the handle.

There are four powerful sucker feet placed on the bottom of the base. It is not recommended to position the joystick on top of the CPC464 cassette unit; you are likely to damage the lid.

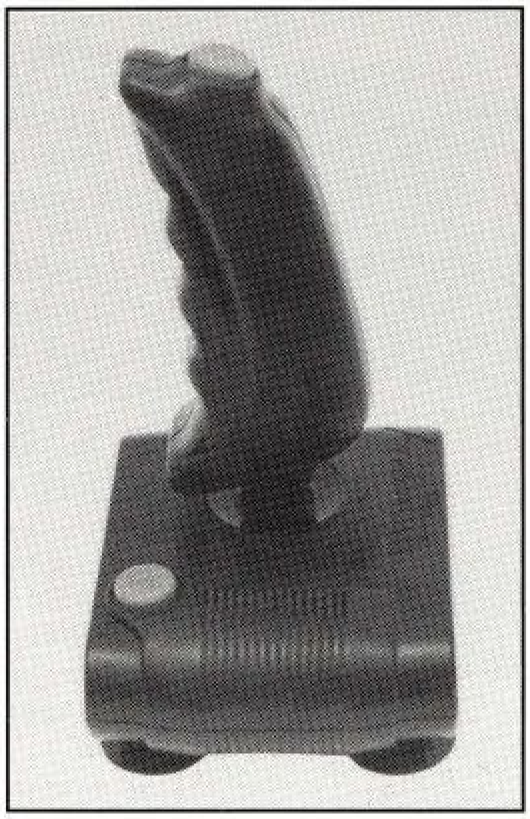
Quickshot I

Supplier : Spectravideo Ltd,
165 Garth Road, Morden, Surrey.

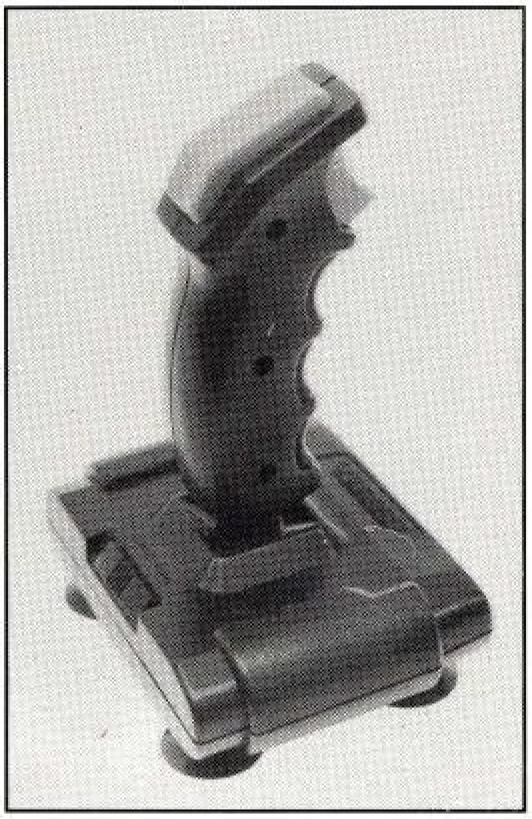
Price	£9.95
Cable Length (ft)	4
No. of Fire Buttons	2

If you are looking for an average sized joystick that is good value for money then this is perhaps the one for you. Although not the most durable of the joysticks that we tested, the Quickshot 1 was one of the most precise, and had the invaluable feature of two firing buttons, one located on the top of the hand grip and one on the left hand side of the base.

The four sucker feet under the base prevented the joystick from wandering aimlessly around the table and encouraged a positive feel from the stalk, although unfortunately it didn't prevent a slightly sluggish response from the fire buttons. We liked this



Quickshot I



Quickshot II

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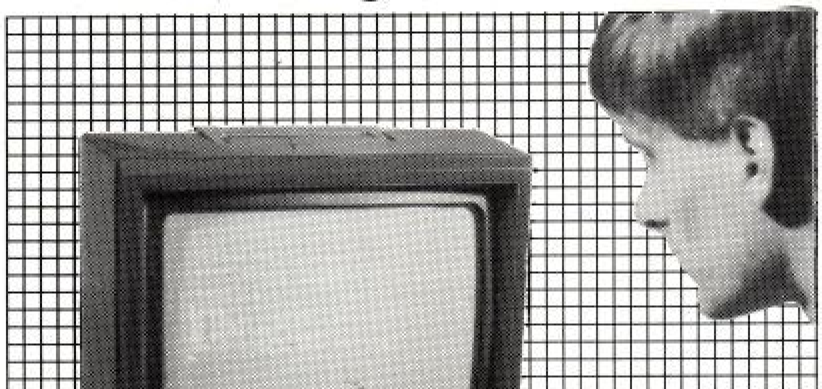
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Unfortunately, the rapid fire special feature of this joystick does not work with the CPC464.

Otherwise, the joystick performed well and was very positive when in use. Again we would not recommend it for hand held use since the base is large, but the strong sucker feet make it a must for table use.

Speed of Response	****
Durability	***
Ease of Use	***
Value For Money	****

Kempston Junior Pro

Supplier: Kempston Micro Electronics Ltd,
Singer Way, Woburn Road
Industrial Estate, Kempston, Bedford.

Price	£5-99
Cable Length (ft)	5 1/2
No of Fire Buttons	1

A very small brightly coloured joystick that is recommended for small hands only, as it name rightly suggests... We disliked the feel of this joystick probably because our hands were too large to obtain a more positive result. The fire button is positioned on the base and rather oddly part of the main plastic moulding, making it stiff and difficult to obtain much control.

The handle seemed sluggish and lacking sensitivity, but the sheer size of the joystick made it extremely suitable for hand held use.



Kempston Junior Pro

Get the children to try out this one before deciding to buy.

Speed of Response	**
Durability	**
Ease of Use	**
Value For Money	***

Kempston Competition Pro 5000

Supplier: Kempston Micro Electronics Ltd,
Singer Way, Woburn Road Industrial Estate, Kempston, Bedford.

Price	£13-50
Cable Length (ft)	5
No of Fire Buttons	2

One of the best features of this joystick is its consideration for left hand users. There are two round arcade style buttons carefully positioned at the front of the base, one for right hand users and one for left hand users. We disliked the stiff feel of the rather short stalk although it was comfortable to hold having a round

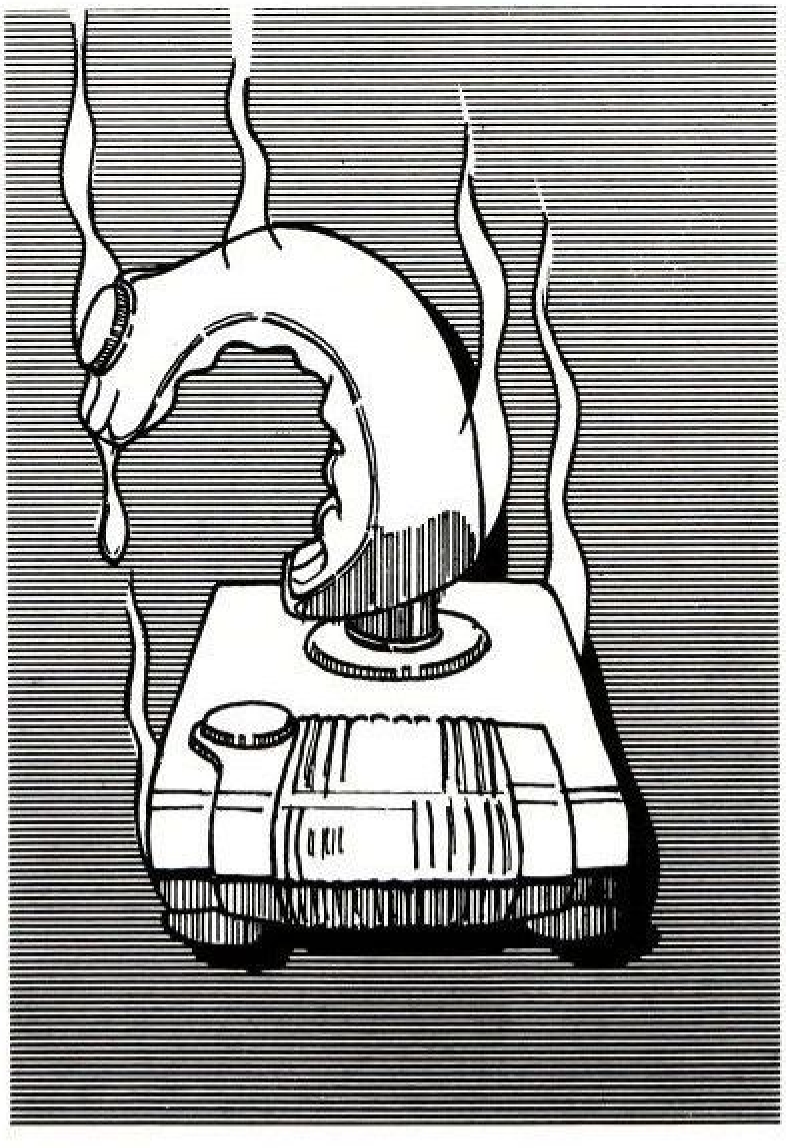


Kempston Comp Pro 5000

knob at the top of the stalk. The joystick has an average sized base that was easy to use in the hand and on the table.

We recieved a fairly good response overall but if used for long periods at a time the stiffness of the main stalk could be rather tiring.

Speed of Response	***
Durability	****
Ease of Use	***
Value for Money	***



SOFTWARE REVIEWS

Sorcery

GAME OF THE MONTH

When they started out, Virgin Games got off to a shaky start. The software industry viewed with trepidation the idea of a record company setting up as a software house. Things were exacerbated by some of the early titles being pretty naff. Virgin soon earned itself a reputation for overpriced software.

To establish yourself in the competitive world of games software is hard enough. Virgin have gone one better and climbed out of a rut.

Sorcery is the most impressive game yet written for the CPC464. The graphics are second to none and the game plays well.





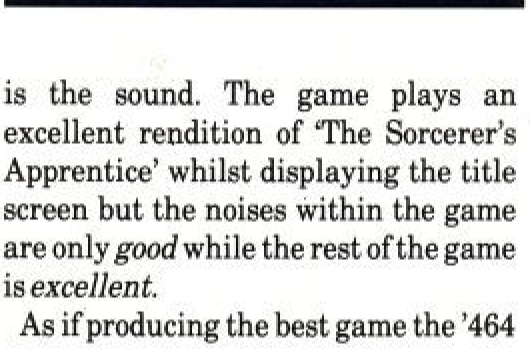
The plot revolves around releasing your fellow sorcerers who have been trapped by the evil necromancer (a character you never see). Each sorcerer is trapped in a cage or behind a door of some kind. To release each one requires the use of a specific object. Finding which object releases which sorcerer is a matter of trial and error.



Some objects have other uses, such as opening doors to locked rooms or killing one or more of the varied monsters.

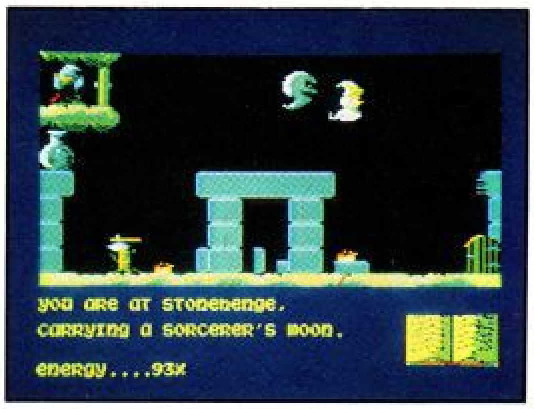
The pictures here show you how impressive the graphics are; the top of the screen is in mode 0 and the bottom in mode 1. The full range of colours has been used to give the image brightness, depth and shading. The turrets look round, the water wet and the doors wooden.

If any feature has been under-used it



is the sound. The game plays an excellent rendition of 'The Sorcerer's Apprentice' whilst displaying the title screen but the noises within the game are only *good* while the rest of the game is *excellent.*

As if producing the best game the '464 has seen wasn't enough, the programmers -known as 'the gang of five'- have re-written the tape loading system so that the game loads at about twice the speed of BASIC speedwrite 1.



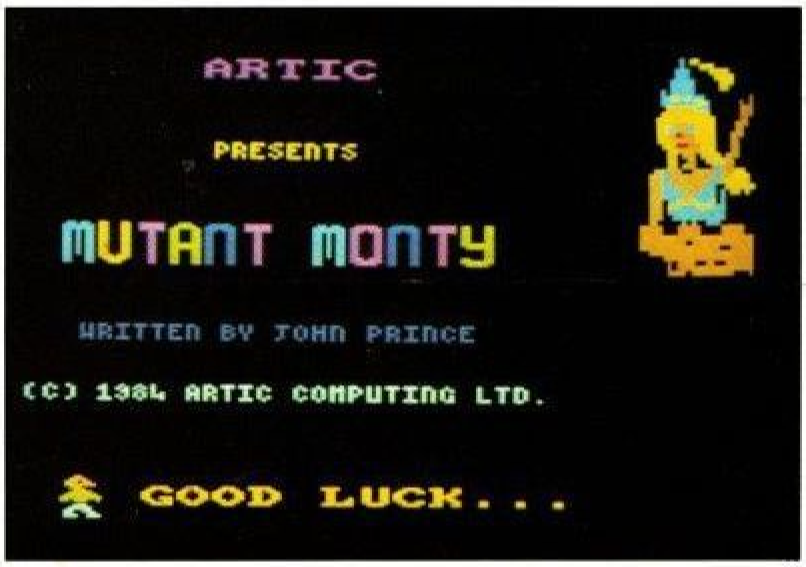
Virgin call this system 'Flashloading'. However this system has a major shortcoming. It won't work on all machines. This is because they expect more of the tape deck than even the CPC464 datacorder is capable of.

All in all Sorcery is excellent value for money. It combines the problem solving and the need to map of an adventure, with the dexterity and slickness of an arcade game. Enjoy!

AUTHOR:	Virgin Games
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	*****
PLAYABILITY:	*****
ADDICTIVENESS:	*****
OVERALL:	*****

Mutant Monty

If you're looking for a fast and furious game to test your reactions, this could be it. The plot's familiar enough - as Mutant Monty, a little guy with a big hooter, you rush around each board collecting all the pots of gold and avoiding the nasties before you can go through the exit leading to the next of the 40 boards.



The graphics make excellent use of the bright colours available on the CPC464. The rooms are imaginatively named and contain a bewildering variety of moving objects which will cost you one of your five lives if you bump into them. There are bunnies, a computer, drops of slime (yuk!) and more. Dodging these sprites, which are all moving in different directions at different speeds, requires careful timing.

The choice of keys is poor and takes some getting used to. (Why don't all games allow user definable keys?) Press a key once to start Monty moving; keep it pressed and he speeds up, so be careful you don't go charging into the back of a baddy.



The Keys 1,2 and 3 have undocumented functions. I'll let you experiment, but you'll be glad to know that one of them shuts off the incredibly boring music.

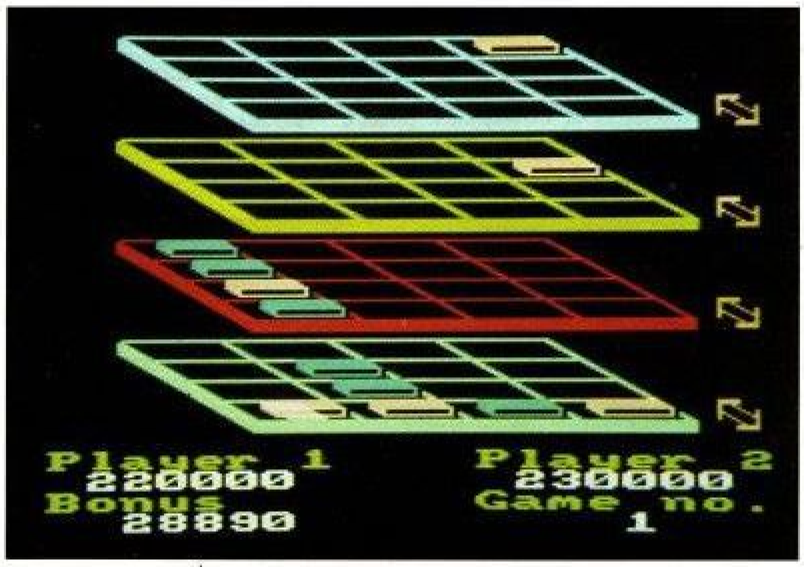
A nice touch is the demo mode which shows a variable selection of the dangers you have to pass before you get to the damsel waiting to be rescued at the end.

Overall an excellent game, but oldies with slow reactions who can't pass the first few screens may prefer to stick with games like Roland in Time where they can choose different starting points.

AUTHOR:	AMSOFT/Artic Computing
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	****
PLAYABILITY:	***
ADDICTIVENESS:	***
OVERALL:	****

Cubit

Cubit is the computerised version of 'Space Lines' which is a 3 dimensional game of 4 in a row. Playing on four planes certainly encourages you to think strategically, looking at each event from every angle.



The object of the game sounds easy enough, (just place four of your pieces in a row either on one plane or from top to bottom), but is more difficult than it first appears, especially when you're playing against the computer.

The game can be played equally well using colour or green monitors, and with the cursor and copy keys acting as the joystick.

Once the program is run, the screen offers the choice of one player against the computer, or two players. When the one player option is selected you can play either first or second. The cursor is moved round the platforms or planes using the joystick, and the fire button is used to change the direction of movement or to place the piece in the selected location. About a minute's practice and it comes naturally. When playing against the computer the responses are very fast and seem to be made almost as soon as your last

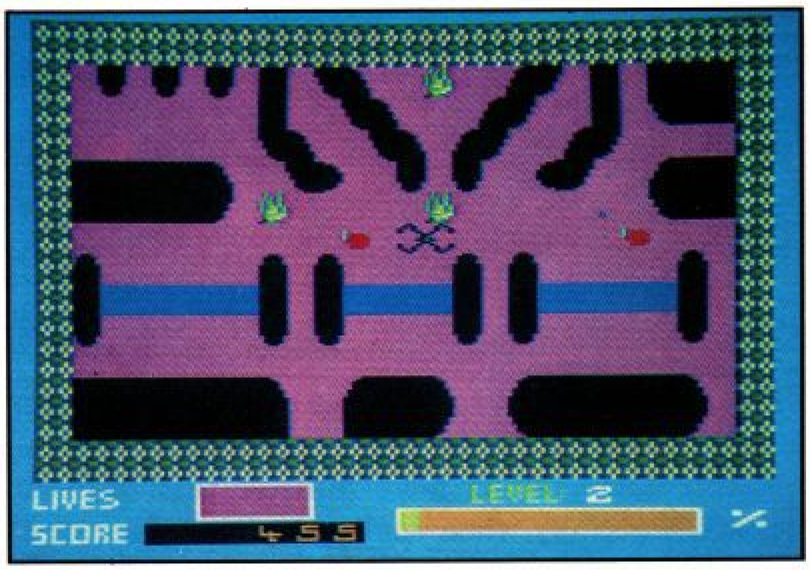
piece has been placed.

When you win a game (ok, so I cheated and played myself) the screen displays the capital letters so you can enter your name in the hall of fame, provided your score is greater than those already there. To enter a name, use the joystick to move the cursor under the character you want and press the fire button. This reviewer had a challenge trying to enter a name; the trick here is in the last three characters of the display. The square is used to enter a space, the arrow to delete a character, and the copyright symbol to enter the name.

AUTHOR	AMSOFT/Mr Micro
FORMAT	Cassette
PRICE	£8.95
GRAPHICS	***
PLAYABILITY	****
ADDICTIVENESS	****
OVERALL	***

Splat

This nicely presented game has the player attempting to control a spider-like creature called Zippy through a complex maze which is continually scrolling in one of four directions.



You must avoid being crushed to death by the enclosing walls formed by the graphics window. Various goodies such as grass and plums are to be consumed en route and a timer controls entry to the next level of difficulty. Each level has additional hazards such as streams and mysterious letters. The demonstration mode provides beginners with a clear understanding of the game strategy.

The game can be played with either joysticks or selectable keys; both versions are demanding tests of co-ordination. Zippy can move up, down, left or right and the additional pause control allows time for route planning.

Despite imaginative lettering in the title and option screens, and a wide range of objects to devour or avoid as levels progress, the game suffers from a limited use of sound effects. The animation also lacks variety as only the central character moves within the maze. Essentially this is a game for those who enjoy a test of reflexes.

The cassette will load with a disc-drive connected and users with a variety of monitors and televisions will appreciate the option to alter the screen background colour.

AUTHOR:	AMSOFT/Incentive software
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	***
PLAYABILITY:	****
ADDICTIVENESS:	****
OVERALL:	****

Laserwarp

Yet another megalomaniac master intent on conquering the galaxy and there's only me here to stop him! Ho Hum, no rest for the budding saviour of the whole world. Let's see now: Z for left, X for right and shift for fire. Seems simple enough, and, after the unmirthful Master vents a screenful of his spleen on me and tells me which blobs to shoot and which to avoid, off I go into worlds of Interstellar Pogos, Whirling Dervishes, Galactic Spiders and the like.



The zapping and the dodging goes on to what sounds like the incessant whining of galactic puppies together with the crack of a galactic cap pistol whenever I strike a blow for humanity. Splat the whatever-they-are on one screen and I gradually win the grudging respect of the Master (which he shows by sending more of his minions after me). These get splatted and I face another tirade from the Master (and maybe get my name on the score table).

The aim is to battle through nine screens of this and finally to do battle with the Master on screen ten (I think he's the one who looks like a clown sitting in a cup and saucer). Alternatively, I can choose to go directly to one of the later screens for a practice run (although I miss the Master's gems of wit by doing this). If I manage to defeat the Master he rises like the phoenix and I am condemned to eternal repetition of my task. Don't think I'll bother.

Not a game which pushes the AMSTRAD to the limits of its capabilities - nor the player.

AUTHOR:	AMSOFT/Mikro-Gen
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	***
PLAYABILITY:	**
ADDICTIVENESS:	**
OVERALL:	***

Star Commando

Star Commando is for enthusiastic zappers of alien ships and blasters of space mines and meteors. As you stare down the fixed sights of your laser gun at the galactic pilots zipping haphazardly around you, (an effect partly dependent on we rookie pilots lurching about space) you will have little difficulty accepting the producer's claim that the use of machine code results in fast action. I had no hesitation in passing it to my seven year old son for a more authentic test flight.



After half a dozen frustrating attempts, not helped by the fact that the relationship between the scoring system and the pattern of events is not explained very well on the packaging (and is a bit difficult to sort out when playing), he began to come to terms with it, and soon had the rest of us reaching for the volume control.

The opposition appears in seven guises, variously located in sixteen sectors of the galaxy. The graphics are good but not exceptional, and the colour combinations used give fairly good clarity on a TV screen. Your only help, a mother ship, like the enemy, can be difficult to find because of faulty sensors, which add an element of chance to proceedings.

Our most experienced typist took to the keyboard but found the key combinations awkward, and soon returned to the joystick, whose action is much more in keeping with the game's format. Come to think of it, I would not want a group of hooked youngsters pounding the keys in search of the score sufficiently high to reveal the codeword to claim their Star Commando wings.

AUTHOR:	AMSOFT/Terminal Software
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	**
PLAYABILITY:	**
ADDICTIVENESS:	**
OVERALL:	**

Xanagrams

Xanagrams is an educational game aimed at children. It is based on a mixture of Anagrams and Crosswords which forms a kind of Scrabble game, but the computer chooses the words from its 4,000 word dictionary.



It has 3 skill levels, the last one for parent and teachers. You can attempt up to 5 words at once, this factor also makes the game harder. Don't despair if you get a little stuck, as there is a help button which reveals a letter but for the loss of points. You score 30 points per correct letter and a lose 5 points per incorrect answer.

The game is very playable and challenging; it has an addictive quality which should keep a child happy as well as making it interesting for the teacher or parents. My only criticism of this game is that it has no

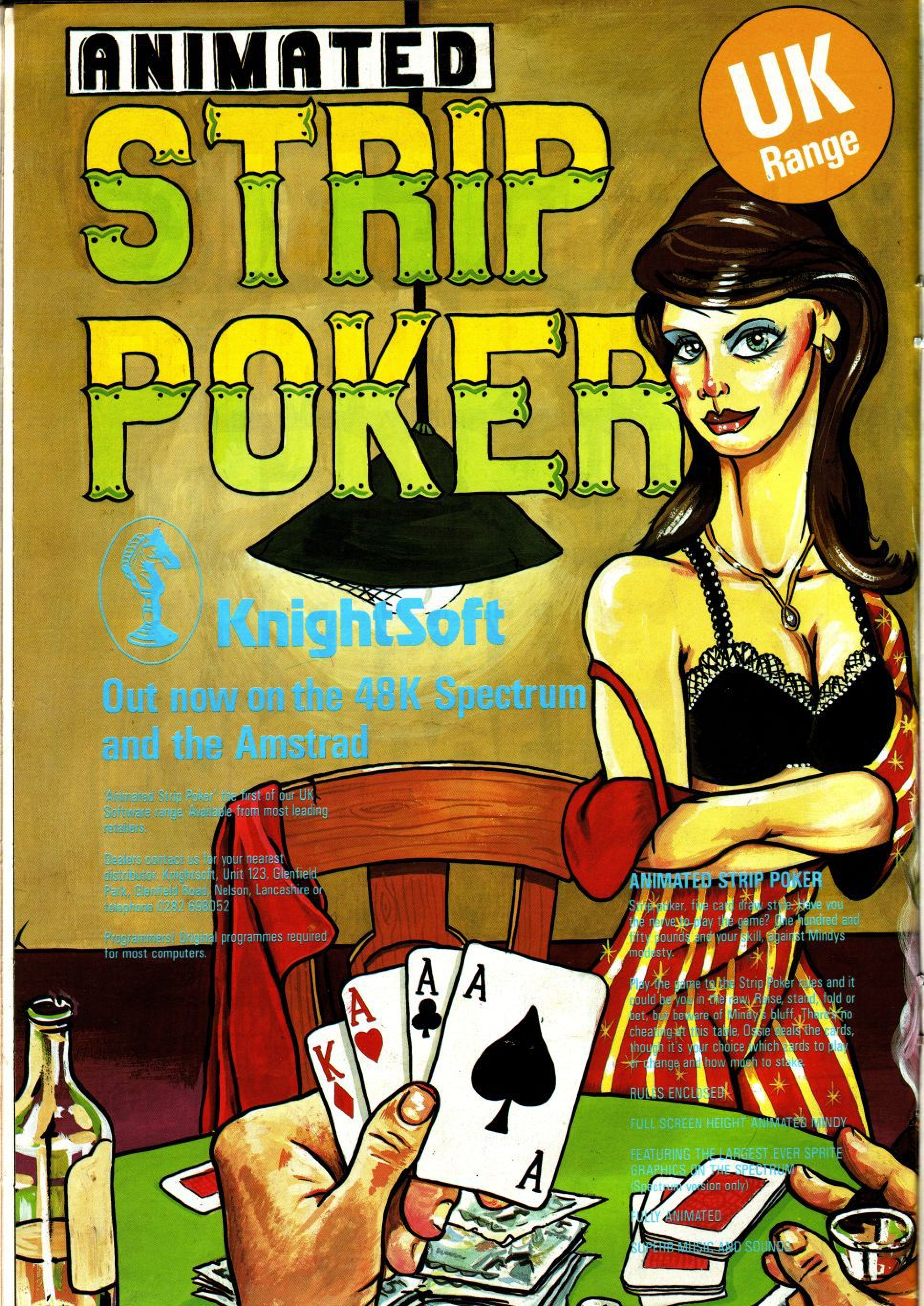
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graphics to brighten the program up, and sound is used very blandly, but overall a very enjoyable game.

AUTHOR:	Amsoft/Dean software
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	N/A
PLAYABILITY:	****
ADDICTIVENESS:	***
OVERALL:	***

Codename Mat

Codename Mat is a program guaranteed to have you hunched over your Amstrad keyboard for hours on



end. A welcome conversion from the Spectrum by Micromega, it depicts space warfare on an epic scale, as you battle to save Earth from the deadly Myon invasion fleet.

The scenario itself is slightly daft. In a plan known as MAT -Mission Alien Termination- the combined tactical skills of all the planetary leaders in the solar system have been implanted in the mind of a teenager, who has been sent out into space in a prototype craft to challenge the aliens. It's probably best to forget this, and remember that it is you against everything else that moves, then get on with the game. And what a game! The Myons start at Pluto and head through nine sectors on their way to Earth. Using your tracking computer and scanners, you have to locate the fast-moving enemy and annihilate the fleet before your planet is destroyed. Combat is depicted in superb three-dimensional graphics with excellent sound effects, and what makes this game extra special is the intelligence shown by the aliens, who adopt different strategies in their attacks upon your ship.

If you get low on energy you will have to dock with a planet to refuel. This can be a tricky manoeuvre, but don't worry if 'Collision alert' flashes up. You will just have to blast the planet out of the way and try again somewhere else. You can't be squeamish about these things when the future of the world is at stake!

Strategy plays an important part in the game. If you choose, you can control the two planetary defence fleets in each sector from your ship, and you also have to decide the right moment to admit defeat in a sector and retreat to the next.

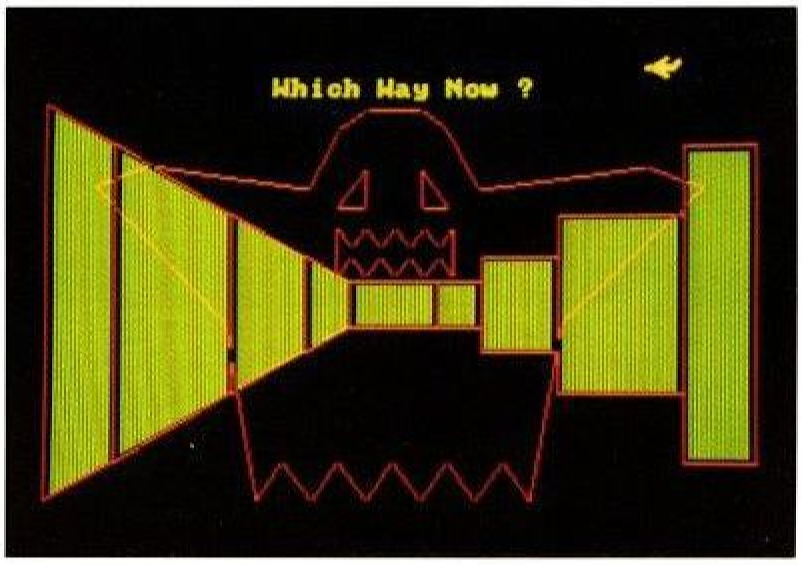
Codename Mat takes hours to play, so a Save option would have been useful, and I was also disappointed at the uninspiring end to the game when, after a titanic struggle, the Myons were finally defeated. But these are minor criticisms of what is otherwise an excellent game which you will come back to again and again.

AUTHOR:	AMSOFT/Micromega
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	****
PLAYABILITY:	****
ADDICTIVENESS:	****
OVERALL:	****

Sultan's Maze

Well, what a disappointment! Why do the descriptions always sound so good, when the games themselves are actually very poor?

'Sultan's Maze' is no exception to this. The main objective is to wander around a 3 D maze, collecting jewels whilst avoiding the evil ghost.



So far, so good; the graphics and maze are fairly well done, but the problems come as you try to stay awake while the graphics are drawn. There is no keyboard buffering so, each step has to be tediously entered individually.

If you can stay awake long enough to reach the higher levels of difficulty, there is still only one evil ghost, although he moves a little faster.

I am not sure quite who this game would appeal to; possibly parents trying to get their children to grasp elementary cardinal points and their application, but

the children would probably much rather be playing one of the fast, colourful machine code programs that are available for the same price.

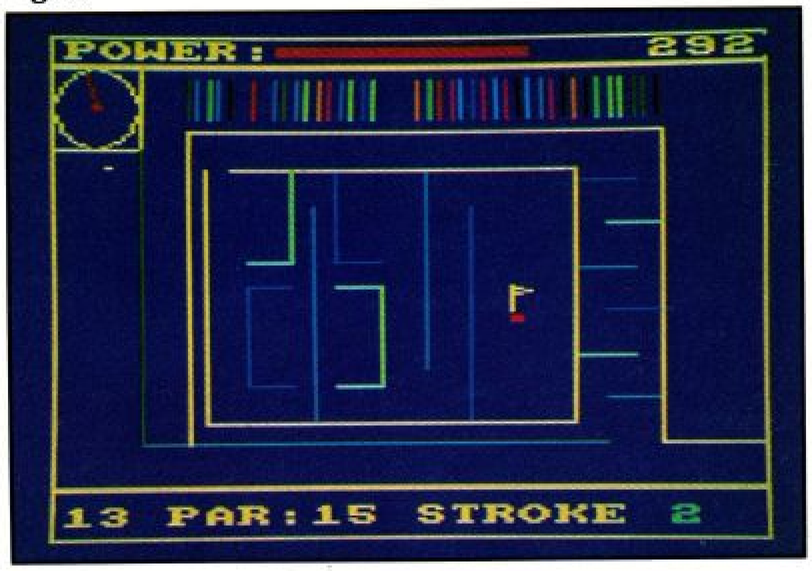
AUTHOR:	AMSOFT/Gem Software
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	***
PLAYABILITY:	**
ADDICTIVENESS:	**
OVERALL:	**

Crazy Golf

Crazy it certainly is, a game full of frustration, as you see your ball bounce around the walls, usually ending up right back where you started.

The game starts off with some pretty graphics, and a short burst of music (I'll name that tune in three) and by pressing the space bar, lo and behold the first hole appears, with its par shown at the bottom of the screen. Joystick compatible, you aim your golf club, set the power level of the stroke and watch your ball go.

The colours are bright, although it is often difficult to see the ball during the eighteen gruelling holes, all with seemingly impossible pars to equal, but my young next door neighbour took to it like a duck to water, and beat my round of 207 (classed as useless at the end), from a possible par of 137, if my arithmetic is right.



All in all, a game for those who are certified, or like to indulge in frustration, but the youngsters certainly enjoyed it.

AUTHOR:	AMSOFT/Mr Micro
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	**
PLAYABILITY:	***
ADDICTIVENESS:	***
OVERALL:	***

Blagger

This was my first experience of a platform type game and I found Blagger to be difficult, addictive and very enjoyable. The game is quite slow paced, possibly too slow for the 'Zapp'em' fanatics, but then the art of this game is not speed but timing. You can use three keys to control the game but I prefer to wear out a joystick rather than my keyboard. The use of sound and colour is excellent as are the graphics and animation. However, I went looking for the volume control soon after starting, partly due to a slight hesitation in the music on occasions of high drama on screen, but mainly because I have certain liking for Ragtime, and too much exposure to a good tune can make it pall.

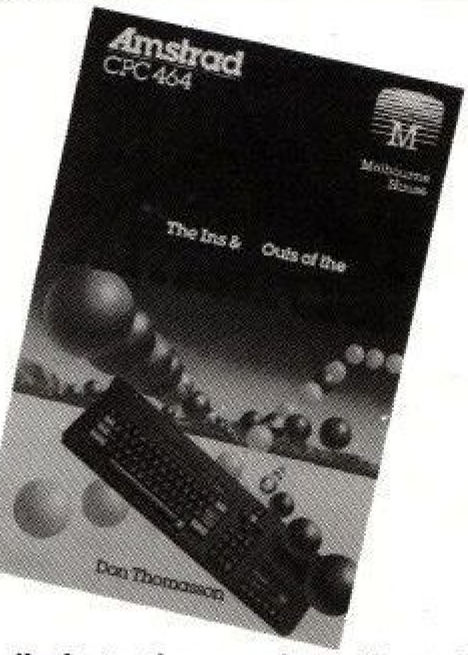


The game is easy to play but I found it almost impossible to progress past screen four. I know of one younger player who passed this level but it took him about three weeks. If you leave the game to run by itself, it will obligingly preview all 20 screens for your delectation - about the only way I'll get to see them!

My verdict? Blagger is an ideal game for the family. Even Dads (and Mums) who can't see the point in it can play and stand a very good chance of matching the achievements of their offspring. I recommend you to buy it, try it and enjoy it! My only adverse comment is that Alligata have made no provision for an infinite lives/practice mode. It can be infuriating to be unceremoniously dumped back at screen one every time you lose the limited lives on later screens. Megascores are magic but I'd settle for a chance to do some leaps and jumps on screens 5 onwards. Other software houses please note.

AUTHOR:	AMSOFT/Alligata
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	****
PLAYABILITY:	****
ADDICTIVENESS:	****
OVERALL:	****

30 Books up for Grabs!



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2 There is no limit to the number of entries any individual can make, however each entry must be on an official entry form. Photocopies can not be accepted.

3 Entries should be sent to:
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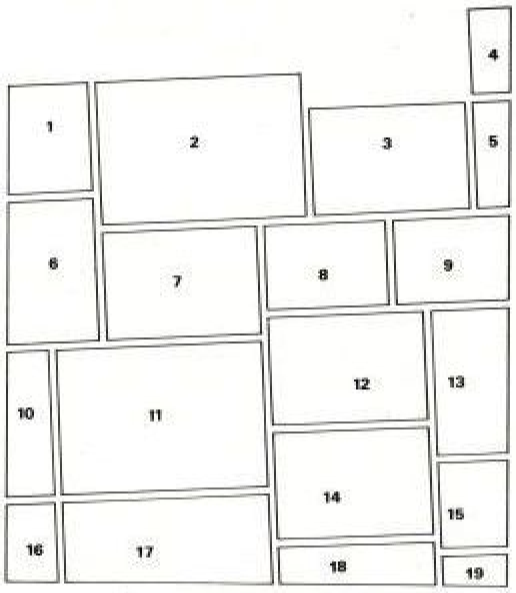
4 No correspondence can be entered into regarding the competition. No entries can be returned.

5 The judges' decision is final, no employees of Amstrad, Amsoft, Amstrad User or their relatives may enter.

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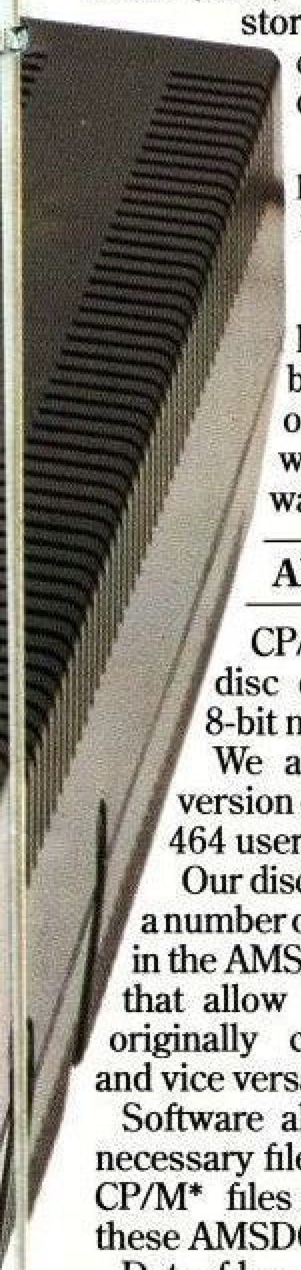
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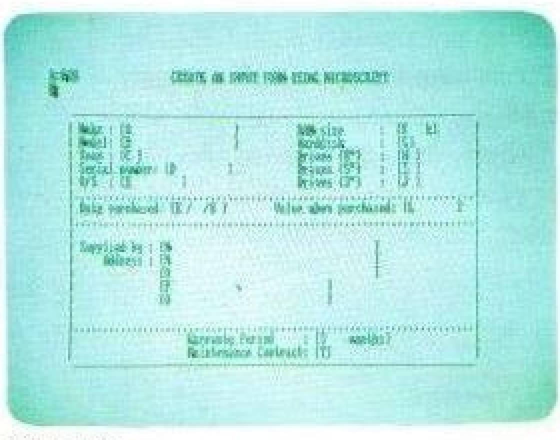
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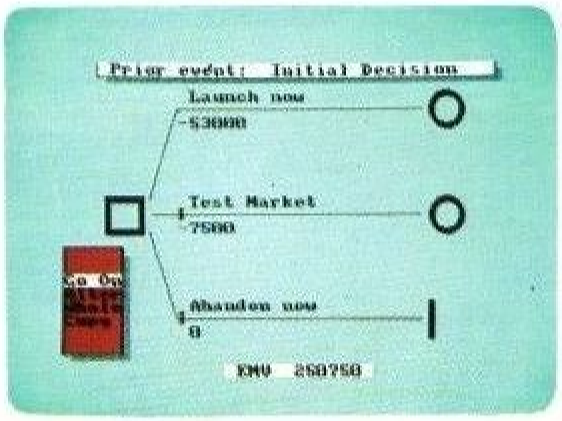
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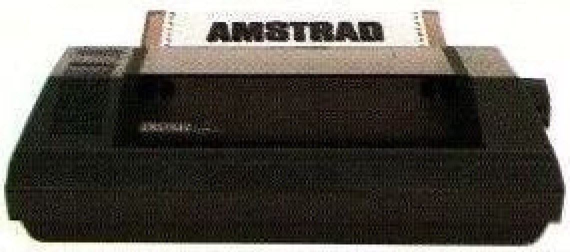
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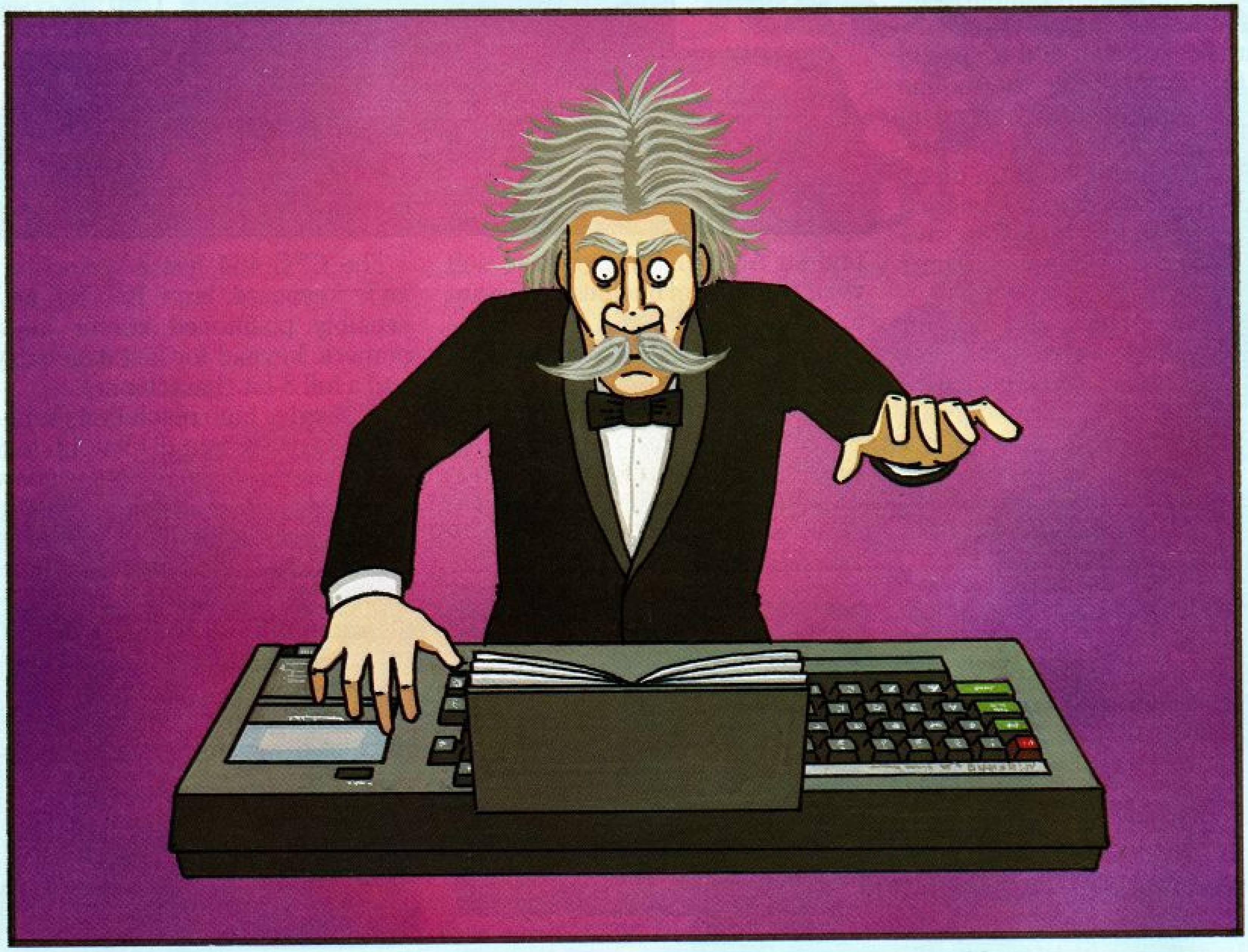
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The Musical Amstrad Part 2

Jeremy Vine



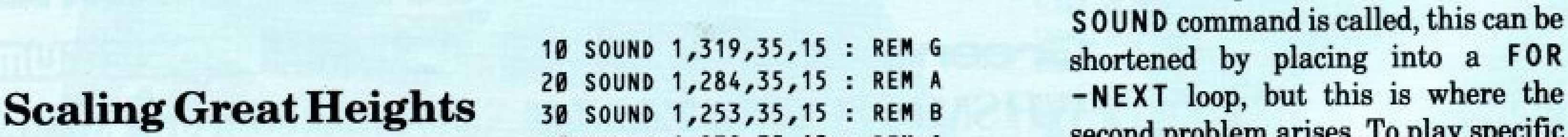
Last month I introduced the basic theory behind sound generation and looked at the first four parameters of the **SOUND** command. This month I intend to look in more detail at the remaining paramters and take the story further on creating music on the Amstrad machine.

Scaling Great Heights

First of all let's use the parameters we have learnt so far to create a musical scale. This on first sight may not appear too mind-blowing but it does introduce us to some new ideas. To begin with, it may seem an idea just to enter a series of **SOUND** statements as follows:

```
10 SOUND 1,319,35,15 : REM G
20 SOUND 1,284,35,15 : REM A
30 SOUND 1,253,35,15 : REM B
40 SOUND 1,239,35,15 : REM C
50 SOUND 1,213,35,15 : REM D
60 SOUND 1,190,35,15 : REM E
70 SOUND 1,139,35,15 : REM F#
80 SOUND 1,159,35,15 : REM G
```

But this method has associated with it a couple of problems. Firstly it is very time consuming to write each **SOUND** statement, in full, every time. As there are common parameters each time the **SOUND** command is called, this can be shortened by placing into a **FOR -NEXT** loop, but this is where the second problem arises. To play specific notes, the **SOUND** command must be



given the correct pitch value. We can improve upon the above program by including these values in a DATA statement but that still isn't as efficient as it could be. The intervals between semitones on the table of pitch and frequencies (given in the user guide appendix) are not uniform, and it's no easy chore to look up and enter a mass of figures every time you wish to play music. Therefore we need a means of converting the frequency of a note into its correct pitch value. The answer lies within the pages of the user guide. Well, almost!

Look up Appendix 7 of your Amstrad user guide and you will find an equation that converts a musical note into its related frequency number. Great! Only one problem. It's wrong!! If you were to use that particular equation, you would end up some 18 semitones away from the musical note you wished to obtain. The correction to this mistake is as follows:

```
frequency=44Ø*(2(octave+((n-1Ø)/12)))
```

This is a very good way of obtaining the correct note as the values to enter are much easier to handle. 'Octave' indicates the octave number over the eight-octave range of the sound chip and 'n' indicates which note is to be sounded, where 1 = C, 2 = C#, etc. But that's not the end of the story. The above equation only gives us a frequency value but the second parameter of the SOUND statement requires the pitch value instead. This means converting the frequency number into its corresponding pitch value. This can be carried out by the second formula in the user guide (which is correct!):

```
Pitch = ROUND (125ØØØ / frequency)
```

Now we have the means to write a scale-playing program without having to look up pitch figures each time. The only table you need refer to is in figure 1. This starts at 'octave' being equal to zero (1 = middle C). To change to high octaves, either to increase the values as shown in figure 1 ('n' in the equation) or change the 'octave' number.

Figure 1.

Note:	Value:
C	1
C#	2
D	3
D#	4
E	5
F	6
F#	7
G	8
G#	9
A	1Ø
A#	11
B	12

We can now write a program to play C major like this:

```
1Ø FORlength=1 TO 8
2Ø READa(y)
3Ø frequency=44Ø*(2(Ø((a(y)-1Ø)/12)))
4Ø pitch=ROUND(25ØØØ/frequency)
5Ø SOUND1,pitch,35,5
6Ø NEXT
7Ø DATA1,3,5,6,8,Ø,2,3
```

Note that I have used the value 13 to represent C above middle C. The same principle can be equally applied to playing other scales or groups of notes.

Let's now leave music for the time being and carry on with the explanation of the remaining parameters of the SOUND command.

Sound Parameters

So far I've explained the first four parameters which allocate the sound channel to be used, the pitch, duration and volume of the sound generated. The next two parameters relate to the envelope command which will be covered later, so let's jump to the final parameter which controls the noise period.

This is a very useful parameter, especially if you're interested in generating sound effects for use in games. This parameter, if used, causes noise to be added to the channel creating sound. It always refers to the value in the first parameter of the SOUND command (channel status). To see what effect the noise period has on a sound try typing any sound you like, for instance:

```
SOUND 1,284,5Ø,7
```

Now to add noise to that sound, use the final parameter. You can enter a value in the range 1 to 31. You must also 'fill-in' the other two parameters even though I have not explained them. For the moment use 'Ø' which will make the line readable to the sound generator. Your program line should now look like this:

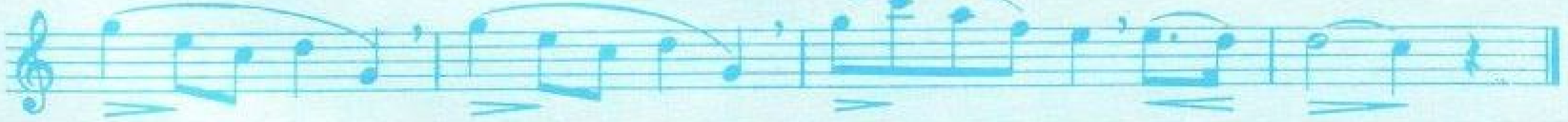
```
SOUND 1,284,5Ø,7,Ø,Ø,1Ø
```

Use different values for 'NP' (noise period) to see what effect this has on the sound created. At the moment you may not see a particular useful purpose for the 'NP' parameter but 'white noise' effects are a useful option especially in producing weird and wonderful sound effects. But enough of that for the moment. There are still a few loose ends to tie up in regard to the SOUND command.

The Amstrad Channel

I mentioned last month that the first parameter, 'C', could have values in the range 1 to 255, but I only explained how to pass sound through an individual channel. However the SOUND statement is far more powerful than it first appears and it offers very powerful facilities which are more than useful to the musical programmer. The most interesting of these facilities is the ability of combining channels of sound together, to play simultaeneously. But unfortunately this is where many people get confused.

Understanding the 'rendezvous' facility isn't as bad as it seems but does require the use of a little mental arithmetic. The first thing to



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understand is the number of different values that can be entered into the 'C' parameter. The value entered is either a number representing one action (ie **SOUND 1** = use channel A) or a number of actions added together into one final value representing all those actions. If the latter part of that sentence didn't make much sense, don't panic! It's not that hard. Honest!

To make this explanation simpler, let's split the possible actions the sound chip can take into its component parts. Firstly the 'C' parameter can indicate the channel status or if you prefer, which channel the sound is to be played through. Secondly, two or more of these channels can be combined together. This is effected by causing one channel to rendezvous with another.

Thirdly, the sound can be held until released (this is related to the **RELEASE** command) and finally the sound channel can be flushed (ie clearing the sound queue).

To create a particular status, the values representing these effects must be used either by themselves or combined together. These basic values are shown in figure 2.

Figure 2.

Value	Effect
1	SOUND channel A
2	SOUND channel B
4	SOUND channel C
8	Rendezvous with channel A
16	Rendezvous with channel B
32	Rendezvous with channel C
64	Hold
128	Flush

To combine more than one effect these values must be added together. To see if you understand this completely, try to work out the following problem before looking at the answer below.

"What is the channel status value of this effect: Send a sound to channel A, rendezvous with channel B and hold".

The answer you should have come up with was 81. This is worked out by:

```
  1 (channel A)
+ 16( rendezvous with B) th B)
+ 64 (hold) = 81
```

Practise with these values until you're sure about how they work. An understanding of these facilities is very important as they are at the basis of creating harmonies in music and synchonisation of sound channels.

Finally for this month I'm going to look at two commands which are often missed by beginners using the sound chip.

Queues of Sound

It is often assumed that the BASIC commands to control the sound chip consist of three statements, **SOUND ENV** and **ENT.** But there are two further commands which you may find extremely useful. The first of these is the **RELEASE** command.

Earlier I described how sounds could be held by using the channel status value of 64. There is no equivalent value in the 'C' parameter of the **SOUND** command to release the 'hold' on the channel. But of course it's possible and that's where the **RELEASE** statement comes in. The range of possible values for this command are from 1 to 7. The value used refers to the channel status being affected. The command **RELEASE 1** would therefore cause the hold state on channel A (if a hold state existed) to cease.

The other command is the **SQ** statement. This refers to the (S)ound (Q)ueue and provides information on the amount of free space in the sound queue. For those not acquainted with the idea of a 'queue' in computing, it can be thought of in more abstract terms. Imagine there are five people queuing in a cloakroom for their coats. Each person holds a ticket which tells the attendant which coat to fetch. The attendant can only deal with one ticket at a time. In a similar way each sound channel can have a queue of events waiting to happen but only one is dealt with at a time. At any one moment in time the queue may be storing a number of events to happen. To determine the state of the sound queue on any channel, we can use the **SQ** command.

The command is followed by the channel status number to which it refers. SQ(1) would therefore refer to channel A (which is 1). Another use of this command is to see whether the sound channel is still active, which means, 'is the sound queue empty or not?'.

We can see this command in use by testing it on a sounding channel.

Type in the next program.

```
10 PRINT"Channel B is now sounding"
20 SOUND 2,358,300,7
30 WHILE SQ(2) > 127:WEND
40 PRINT"That's all folks!"
```

The final message in line 40 should not appear until the sound queue is cleared or the termination of the sound. If you remove line 30 you'll be able to see more clearly the effect this command is having. Line 30 continually tests the sound queue of channel B (2) to see if it is clear. The value of 127 is important as a value greater than 127 will indicate that the sound channel is still active. Once the sound channel becomes inactive this loop is broken and the final message can be displayed.

And that's where I finish for this month. As with my concluding comments last time, play around with these commands until you're sure you understand them and next month we will take the musical story further.

Jeremy Vine is a freelance writer and has published two books on the CPC464, which includes a book on sound and music, 'Bells and Whistles on the Amstrad CPC464', published by Shiva Publishing Ltd. at £4.95p.



MISSILE Attack!!

OK all you super heros, here's a very well presented CPC464 version of the arcade favourite 'Missile Command' game.

Missile Attack has an instruction screen with music and a main screen. The main screen changes colour after each 'wave' of alien missiles - and the idea of the game is to protect the six cities from the missile attack. The game finishes when all the cities are destroyed.

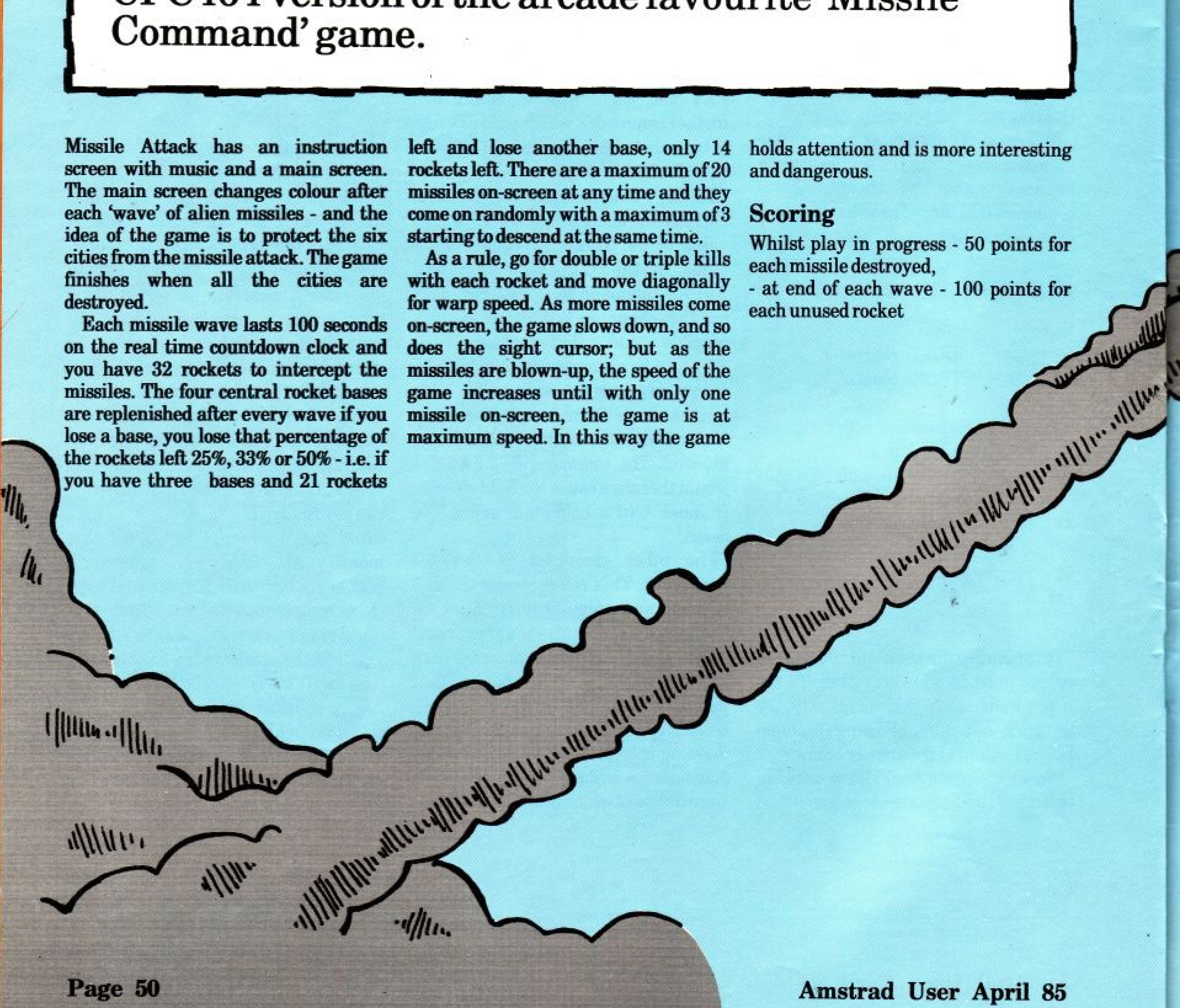
Each missile wave lasts 100 seconds on the real time countdown clock and you have 32 rockets to intercept the missiles. The four central rocket bases are replenished after every wave if you lose a base, you lose that percentage of the rockets left 25%, 33% or 50% - i.e. if you have three bases and 21 rockets left and lose another base, only 14 rockets left. There are a maximum of 20 missiles on-screen at any time and they come on randomly with a maximum of 3 starting to descend at the same time.

As a rule, go for double or triple kills with each rocket and move diagonally for warp speed. As more missiles come on-screen, the game slows down, and so does the sight cursor; but as the missiles are blown-up, the speed of the game increases until with only one missile on-screen, the game is at maximum speed. In this way the game holds attention and is more interesting and dangerous.

Scoring

Whilst play in progress - 50 points for each missile destroyed,

- at end of each wave - 100 points for each unused rocket

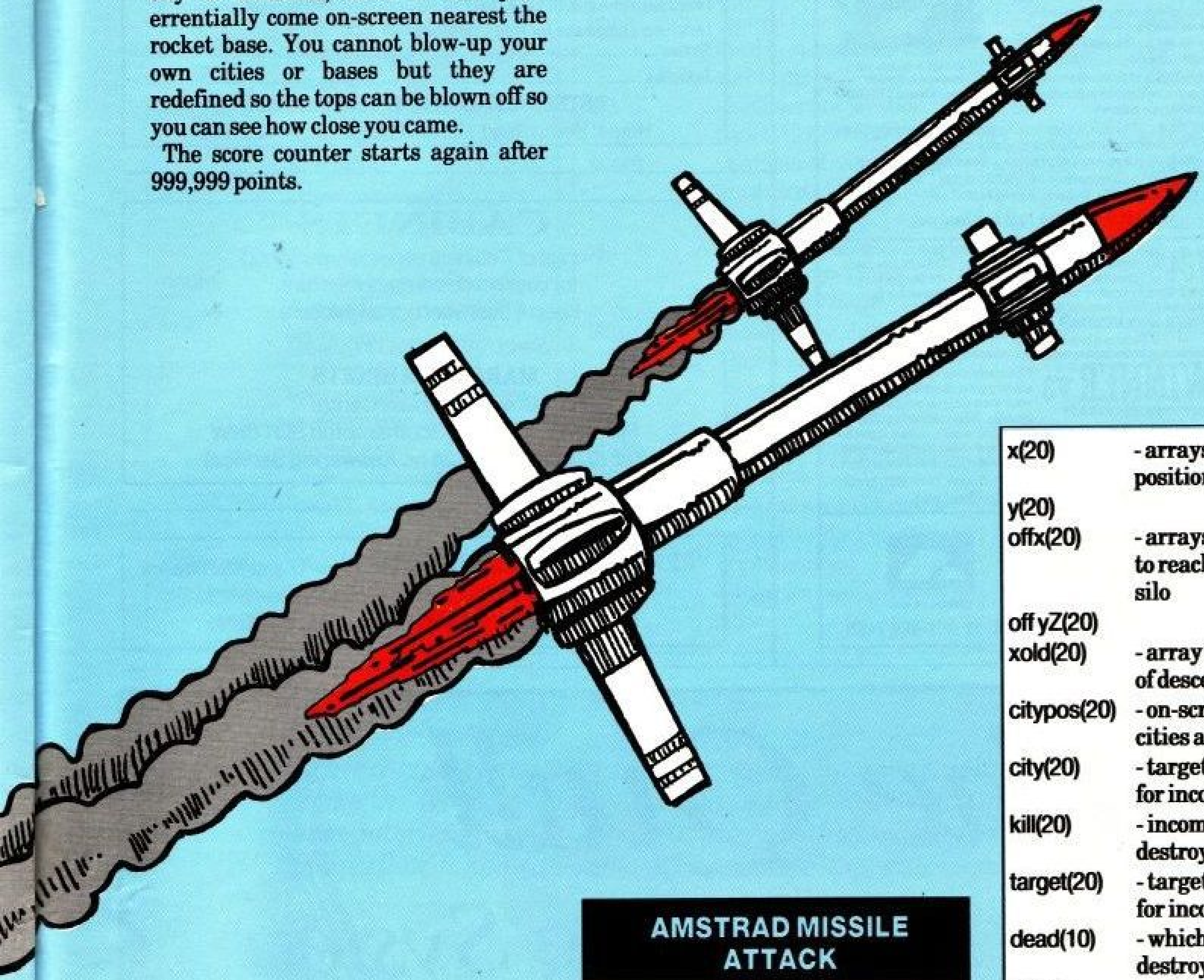


- at end of each wave - 1,000 points for each city left.

Bonus city every 20,000 points.

If cities are wrecked when the bonus city is awarded, then it will preferrentially come on-screen nearest the rocket base. You cannot blow-up your own cities or bases but they are redefined so the tops can be blown off so you can see how close you came.

The score counter starts again after 999,999 points.



The game is played by joystick or cursor keys with the [COPY] key being the same as the fire button.

The stereo music at the start and finish of the game is the Toreadors' Song by Bizet from his opera Carmen. There are numerous action sounds throughout the game - *all in stereo* and lots of programming tricks to improve playability.

For a demo game, change line 270 from :

```
EVERY 5000,1 GOSUB 1000
```

to :

```
EVERY 500,1 GOSUB 1000
```

and this will make each wave last 10 seconds instead of 100 seconds.

AMSTRAD MISSILE ATTACK

Breakdown of the program:-

120-280	Screen Initialization
300-340	Calculate targets and number of bombs
360-520	MAIN LOOP - move bombs and sight cursor
540-550	Bomb hits target
570-700	Destroy city or silo subroutine
720-950	Subroutine to launch rockets, check for missile hits, etc.
970-980	Decrement clock interupt
1000-1190	End of wave interupt
1210-1520	Instructions and redefined characters
1540-1580	Real-Time music routine
1600-1750	Toreadors Song
1770	Data for city positions.

Arrays:-

Arrays are in lower case and are shown as they appear in the program.

x(20)	- arrays for missile positions
y(20)	
offx(20)	- arrays for missile offsets to reach targetted city or silo
off yZ(20)	
xold(20)	- array for start positions of descending missiles
citypos(20)	- on-screen positions of cities and silos
city(20)	- targetted city position for incoming missile
kill(20)	- incoming missile destroyed
target(20)	- targetted, city number for incoming missile
dead(10)	- which silo's and cities are destroyed
hit(10)	- which missile your rocket has hit

Variable list

as they appear in the program:-

sight x sight y	- x and y position of sight cursor
pressed	- used to check if keyboard or joystick is operated.
dummy	- used to terminate real-time music and sound routines.
cnum	- number of cities
silo num	- number of feet Silos
mnum	- number of feet anti-ballistic missile rockets.
tim	- time left in wave attack
count	- used in calculating bonus cities.

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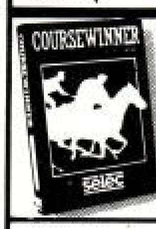
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son$, soff$	- used to toggle transparent mode.
n	- used as loop variable
basepos	- screen position of start of silos
num	- number of missiles descending at same time -max of 3
stagger	- number of on-screen missiles before calling new ones.
city	- used in targetting missile onto cities, and silos
bnum	- total number of missiles descending - max of 20 on-screen.
pass	- allows twice speed operation of sight cursor -remove line 360 for harder game
x,y	- values of x and y arrays -used to speed up calculation
sightxold, sightyold	- previous positions of sight cursor
up,down, left,right	- keyboard or joystick direction detection
a,b,c	- sound volume variables, used in stereo tracking of sight cursor
sty	- sound tone variables, used in stereo tracking of sight cursor
fire	- keyboard or joystick rocket fire detection.
score	- number of bonus cities -awarded every 20,000 points.
vol	- used in crescendo effect for the Theme tune -Toreadors' Song.
flag	- used in key changes for Theme tune.
wipe	- removes incoming missile vapour trail
crash	- sound for destruction of city or silo
m	- used as a loop variable
boink	- sound used when rockets are exhausted
sx,sy	- graphics position of sight cursor
blank,z, boomx, boomy, z1, z2	used for drawing the rocket explosion zone of influence.
kill	- number of missiles killed by each rocket explosion
remove	- removes missile offscreen.
bang	- sound used when missile is removed offscreen.
colour	- background (paper) colour for each wave
score!	- a real variable used when scoring, denoted by “ ”
refresh, check	- used in restoring city or silo to the screen
score$	- “ ” printing score onto the screen
a$	- joystick or keyboard detection
note	- note played in Theme Tune

The following is a computer originated listing, typeset from source obtained from the running program. In order to make the listing fit tidily, some lines have been wrapped in the typesetting process. This should not have interfered in any way with the operation of this program, but where lines have been wrapped, the overflow is shown emphasised by indenting with spaces which need not necessarily be entered.

```
100    REM    Missile Attack                    22/9/84        D. & B. Lewis
110    REM    Initialisation
120 DEFINT a-z:DEFREAL o,x,y
130 DIM x(20),offx(20),xold(20),y(20),offy(20),citypos(10),city(20),
    kill(20),target(20),dead(10)
140 sightx=10:sighty=10:pressed=0:GOSUB 1210:dummy=SQ(2)
150 MODE 0:RANDOMIZE TIME:ORIGIN 0,0,0,639,380,0
160 cnum=6:silonum=4:mnum=32:tim=99:count=1
170 son$=CHR$(22)+CHR$(1):soff$=CHR$(22)+CHR$(0)
180 RESTORE 1770:PEN 9:LOCATE 1,1:PRINT "T:99";
190 PEN 5:LOCATE 7,1:PRINT "S:000000";:PEN 10:LOCATE 17,1:PRINT "R:32";
200 FOR n=1 TO 10:READ citypos(n):dead(n)=0:NEXT n:basepos=9
210 INK 0,0:BORDER 0:INK 1,21:INK 2,23:INK 3,16:INK 5,7
220 FOR n=0 TO 4 STEP 2:PLOT 0,n,5:DRAW 639,n:NEXT n:PRINT son$;
230 PEN 9:FOR n=1 TO 10:IF n>3 AND n<8 THEN 250
240 LOCATE citypos(n),25:PRINT "[]";
250 NEXT n:PEN 10:LOCATE basepos,25:PRINT "↑↑↑↑";soff$;
260 PLOT 0,6,15:DRAW 0,14:PLOT 639,6:DRAW 639,14
270 EVERY 5000,1 GOSUB 1000
280 EVERY 50 GOSUB 970
290    REM    Calculate targets & No of bombs
300 num=1+CINT(RND*2):FOR n=1+stagger TO num+stagger
310    x(n)=CINT(RND*640):y(n)=400:xold(n)=x(n)
320    city=1+CINT(RND*9):city(n)=CINT(32*citypos(city)+16*(city>3 AND city<8))
330    target(n)=city:offx(n)=(city(n)-x(n))/100:offy(n)=(0-y(n))/100
340 NEXT n:bnum=num+stagger
350    REM    Main loop - move bombs & sight
360 IF pass THEN 410
370 FOR n=1 TO bnum
```

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```
380 x=x(n):y=y(n):PLOT x,y,1:x=x+offx(n):y=y+offy(n):PLOT x,y,3:x(n)=x:y(n)=y
390 IF y<20 THEN GOTO 540
400 NEXT n
410 pass=1-pass:sightxold=sightx:sightyold=sighty
420 sighty=sighty+((INKEY(up)=pressed)-(INKEY(down)=pressed))
430 IF (sighty<2 OR sighty>23) THEN sighty=sightyold
440 sightx=sightx+((INKEY(left)=pressed)-(INKEY(right)=pressed))
450 IF (sightx<1 OR sightx>20) THEN sightx=sightxold
460 a=-((sightx<4)+(sightx<7)+(sightx<10))
    :c=-((sightx>17)+(sightx>14)+(sightx>10)):b=3-(a+c)
470 sty=sighty*50:SOUND 129,sty,99,a:SOUND 130,sty,99,b:SOUND 132,sty,99,c
480 DI:PEN 4:LOCATE sightxold,sightyold:PRINT " ";
490 LOCATE sightx,sighty:PRINT "+";:EI
500 IF INKEY(fire)=pressed THEN GOSUB 720
510 IF (RND<0.015 AND bnum<18) THEN stagger=bnum:GOTO 300
520 GOTO 360
530    REM    Bomb hits target !
540 GOSUB 570:IF bnum=0 THEN stagger=0:GOTO 300 ELSE GOTO 360
550    END
560    REM    Destroy city etc
570 city=target(n):IF dead(city)=1 THEN 610
580 dead(city)=1:IF (city>3 AND city<8) THEN mnum=CINT(mnum-
    mnum/silonum):silonum=silonum-1:GOSUB 940:IF silonum<1 THEN
    mnum=0:silonum=1:GOTO 610 ELSE 610
590 cnum=cnum-1:IF (cnum+store)>0 THEN 610 ELSE dummy=REMAIN(0)
    :dummy=REMAIN(1):vol=0:flag=1:RESTORE:ON SQ(2) GOSUB 1540
600 GOTO 600
610 FOR wipe=-4 TO 4 STEP 4:MOVE xold(n)+wipe,400:DRAW city(n)+wipe,0,0
    :NEXT wipe
620 DI:city(n)=CINT(city(n)/32):PEN 6:LOCATE city(n),25
630 IF city(n)<9 OR city(n)>12 THEN PRINT "/\";
    ELSE PRINT "-";
640 PLOT 0,0,5:DRAW 639,0:PLOT 0,6,15:DRAW 0,14:PLOT 639,6:DRAW 639,14
650 FOR crash=999 TO 0 STEP -15:SOUND 135,RND*crash,1,7,0,0,7:NEXT crash:EI
660 FOR m=n TO bnum-1
670    x(m)=x(m+1):y(m)=y(m+1):offx(m)=offx(m+1):offy(m)=offy(m+1)
680    city(m)=city(m+1):target(m)=target(m+1):xold(m)=xold(m+1)
690 NEXT m:bnum=bnum-1
700    RETURN
710    REM    Launch rockets !!
720 IF mnum<1 THEN FOR boink=300 TO 0 STEP -10:SOUND 130,boink,1,5:NEXT
    boink:GOTO 950
730 sx=CINT(sightx*32-16):sy=CINT(408-sighty*16)
740 PLOT 0,16,14:DRAW sx,sy:PLOT 639,16:DRAW sx,sy
750 DI:PLOT sx,sy,11:blank=0:kill=0
760 z=0:boomx=25:boomy=0
770 z1=z+boomy+boomy+1:z2=z1-boomx-boomx1+1:MOVE sx,sy:DRAWR boomx,boomy
780 MOVE sx,sy:DRAWR -boomx,boomy:MOVE sx,sy:DRAWR boomx,-boomy:MOVE sx,sy
790 DRAWR -boomx,-boomy:MOVE sx,sy:DRAWR boomy,boomx:MOVE sx,sy
800 DRAWR -boomy,boomx:MOVE sx,sy:DRAWR boomy,-boomx:MOVE sx,sy
810 DRAWR -boomy,-boomx:z=z1:boomy=boomy+2:EI
820 SOUND 129,boomx:SOUND 130,z1:SOUND 132,boomy
830 IF ABS(z2)<ABS(z1) THEN z=z2:boomx=boomx-1
840 IF boomx>boomy THEN 770
850 IF blank THEN 940
860 FOR n=1 TO bnum:IF TEST(x(n),y(n))=11 THEN kill=kill+1:hit(kill)=n
870 NEXT n:IF kill=0 THEN 920
880 FOR remove=1 TO kill:n=hit(remove)
890 FOR wipe=-4 TO 4 STEP 4:MOVE xold(n)+wipe,400:DRAW x(n)+wipe,y(n),0:NEXT
    wipe
900 FOR bang=1500 TO 100 STEP -25:SOUND 5,RND*bang,2,bang/200,0,0,bang/100:NEXT
    bang:GOSUB 660:FOR m=remove+1 TO kill:hit(m)=hit(m)-1:NEXT m
910 NEXT remove:score!=score!+50*kill:DI:GOSUB 1150
920 blank=1:DI:PLOT 0,16,0:DRAW sx,sy:PLOT 639,16:DRAW sx,sy
930 mnum=mnum-1:PLOT sx,sy,0:GOTO 760
940 DI:PEN 10:LOCATE 19,1:PRINT USING "##";mnum;:EI
950    RETURN
960    REM    Decrement clock interrupt
970 DI:tim=tim-1:PEN 9:LOCATE 3,1:PRINT USING "##";tim;:EI
980    RETURN
990    REM    End of wave etc interrupt
1000 colour=colour+1:IF (colour=2 OR colour=7 OR colour=12 OR colour=14 OR
     colour=16 OR colour=21 OR colour=24) THEN 1000
1010 IF colour=26 THEN colour=0
1020 INK 0,colour:BORDER colour:tim=100
1030 score!=score!+1000*cnum+100*mnum:silonum=4:mnum=32:GOSUB 940
1040 FOR refresh=4 TO 7:dead(refresh)=0:NEXT refresh
1050 PEN 10:LOCATE basepos,25:PRINT son$;"___";soff$;
```

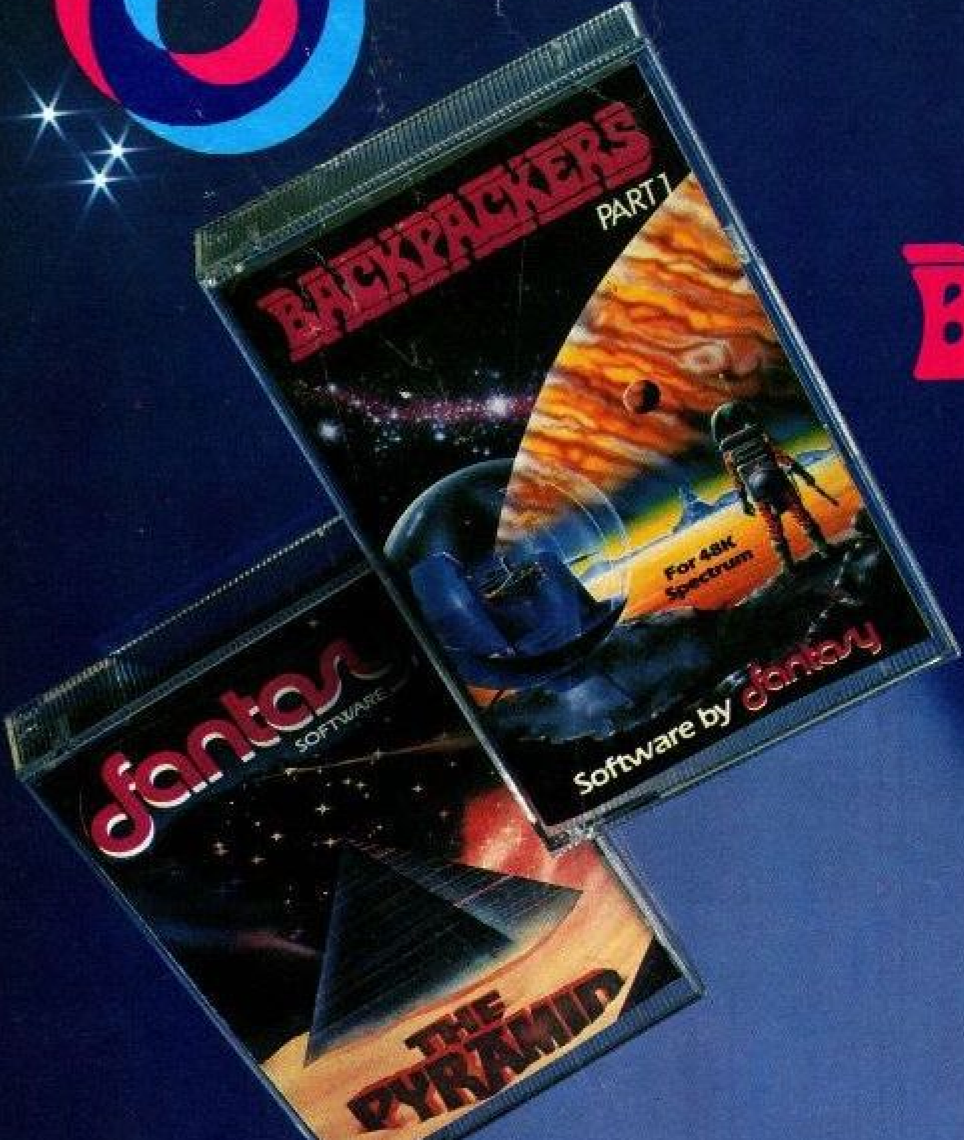
```
1060 IF (score!/count)>=20000 THEN count=count+1:store=store+1:FOR refresh=1 TO
     99:SOUND 130,RND*refresh,1,7:NEXT refresh
1070 IF (cnum=6 OR store=0) THEN 1150
1080 FOR check=1 TO 3:refresh=7+check:IF dead(refresh)=0 THEN refresh=4-check:IF
     dead(refresh)=0 THEN 1140
1090    dead(refresh)=0:cnum=cnum+1:store=store-1
1100    PEN 5:LOCATE citypos(refresh),25:PRINT son$;CHR$(255);CHR$(255);
1110    PEN 9:LOCATE citypos(refresh),25:PRINT "[]";soff$;
1120    IF (cnum=6 OR store=0) THEN 1150
1130    IF refresh>7 THEN refresh=4-check:IF dead(refresh)=1 THEN 1090
1140 NEXT check
1150 IF score!>999999 THEN score!=score!-1000000:count=1:PEN 5:LOCATE 9,1:PRINT
     "000000";
1160 score$=STR$(score!):score$=MID$(score$,2)
1170 LOCATE (14+(score!>9)+(score!>99)+(score!>999)+(score!>9999)+
     (score!>99999)),1
1180 PEN 5:PRINT score$;
1190    RETURN
1200    REM    Initialisation (characters,keys,etc)
1210 vol=0:flag=1:RESTORE:ON SQ(2) GOSUB 1540
1220 MODE 1:INK 0,13:INK 1,0:INK 3,22:BORDER 13
1230 PEN 1:LOCATE 13,1:PRINT "MISSILE ATTACK"
1240 PEN 3:LOCATE 8,3:PRINT "By David and Brian Lewis"
1250 PEN 2:LOCATE 1,5:PRINT "You are on the Planet DARTSMA, and you"
1260 PRINT "have to defend your six cities from an"
1270 PRINT "Awesome Alien Missile Attack !!"
1280 PRINT "Each wave lasts 100 seconds, and you"
1290 PRINT "start with 32 rockets to intercept the"
1300 PRINT "incoming missiles. The rockets are in"
1310 PRINT "four central bases, losing one means"
1320 PRINT "losing that fraction of your remaining"
1330 PRINT "rockets. The end of each wave gets you"
1340 PRINT "100 points for each rocket unused, and"
1350 PRINT "1000 points for each city left. Every"
1360 PRINT "20000 points bonus cities are awarded."
1370 PRINT "HINT:-  Go for double or triple kills,"
1380 PRINT "and move diagonally for maximum speed."
1390 PEN 1:LOCATE 1,21:PRINT "The fate of DARTSMA is in your hands !!"
1400 PEN 2:LOCATE 15,23:PRINT "GOOD LUCK"
1410 PEN 3:LOCATE 5,25:PRINT "Press FIRE button or SPACE bar";
1420 a$=INKEY$:IF (a$<>" " AND a$<>"X") THEN 1420
1430 IF a$=" " THEN up=0:down=2:left=8:right=1:fire=9
     ELSE up=72:down=73:left=74:right=75:fire=76
1440 SYMBOL AFTER 0
1450 SYMBOL ASC("["),&8,&8,&A,&1A,&3F,&3F,&3F
1460 SYMBOL ASC("]"),0,0,&80,&D0,&F8,&FC,&FC
1470 SYMBOL ASC("/"),0,0,0,0,0,&C0,&F0
1480 SYMBOL ASC("\"),0,0,0,0,0,&3,&F
1490 SYMBOL ASC("_"),&18,&18,&18,&3C,&3C,&FF,&FF
1500 SYMBOL ASC("-"),0,0,0,0,0,&C3,&E7
1510 SYMBOL 255,0,0,0,0,0,&FF,&FF,&FF
1520    RETURN
1530    REM    Real-time music routine
1540 READ note:IF note=-1 THEN RESTORE:vol=2-vol:flag=flag*2+15*(flag=8):GOTO
     1540
1550 IF note=0 THEN SOUND 7,0,8,0:GOTO 1570
1560 SOUND 1,note\flag-1,8,4+vol:SOUND 2,note\flag,8,5+vol:SOUND
     4,note\flag+1,8,4+vol
1570 ON SQ(2) GOSUB 1540
1580    RETURN
1590    REM    Data for 'TOREADORS SONG'        from CARMEN   by BIZET
1600 DATA 478,478,478,478,426,426,426,0,478,0,568,568,568,568,0
1610 DATA 568,568,568,568,0,568,568,568,638,568,568,568,506
1620 DATA 568,568,568,568,568,568,568,568,0,506,506,506,506,638,638,638,0
1630 DATA 478,0,568,568,568,568,568,568,568,568,0,716,716,716,716
1640 DATA 851,851,851,0,638,0,956,956,956,956,956,956,956,956,0
1650 DATA 638,638,638,638,638,638,638,638,0,638,638,426,426,478,478,0
1660 DATA 506,506,0,568,568,568,0,638,0,568,568,568,0,506,0
1670 DATA 568,568,568,568,568,568,568,568,0,758,758,758,758,0
1680 DATA 568,568,568,568,568,0,568,568,568,568,0,602,602,602,0,506,0
1690 DATA 379,379,379,379,379,379,379,379,379,379,379,379,379,379,379,379
1700 DATA 379,379,0,426,379,426,0,451,451,0,426,426,0
1710 DATA 638,638,0,568,568,0,506,506,506,506,506,506,0,568,506
1720 DATA 568,0,716,716,0,426,426,0,478,478,478,478,478,478,478,478
1730 DATA 478,478,0,716,716,0,956,956,0,506,506,0,568,568,568,568,0
1740 DATA 638,638,638,638,0,716,716,956,851,758,716,638,568,506,478,426,379
1750 DATA 358,319,284,253,-1
1760    REM    Data for City positions
1770 DATA 1,4,7,9,10,11,12,13,16,19
```

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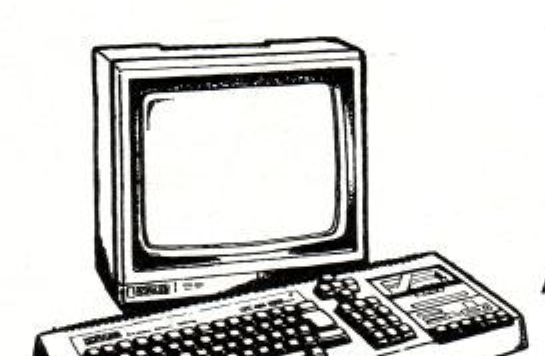
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It is a cold winter's morning and you are standing on the steps of your great uncle Victor Frankenstein's mansion. A white mist surrounds the mansion, which is boarded up and overgrown with ivy. "What am I here for ?", you ask yourself as you look at the note prinned to the door... and so the game begins.

In this game you will play the roll of Frankenstein's great nephew who has received an urgent phone call to visit the family mansion, which has been allowed to fall into a state of neglect for many years. You are unsure what your mission is and all you see before you is a note and the keys to the mansion.

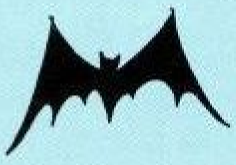
To help you, here is a list of words understood:
help, pray, phone, score, ride, go, n, s, e, w, up, down, in, out, look, eat, drink, wash, swim, get, take, grab, drop, leave, put, inventory, read, open, unlock, search, light, squeeze, unscre, score, break, smash, dig, pull, quit, save, load, connect, talk, ask, say, row, sail, wait, jump, kiss, rub, dance, fit, help, sew, connect.

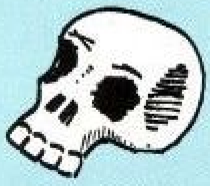
You should give me instructions in the form of one or two word sentences such as EAT SANDWICH or GO IN.

If you want to save a game at any point, just type SAVE. Your tape may then be loaded back in by typing LOAD.

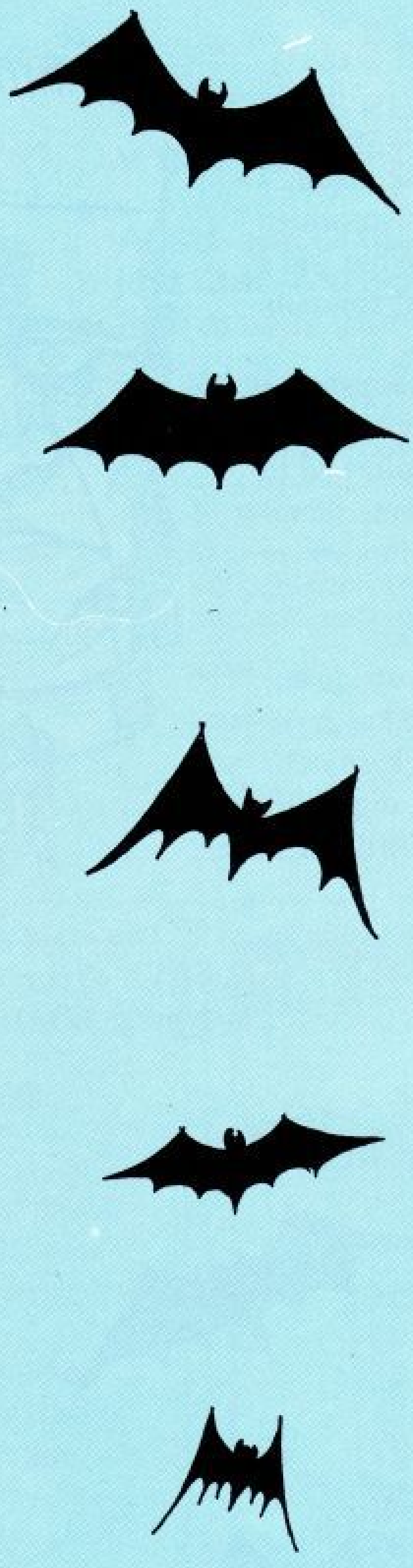
```
10 ' *************************************
  *************************************
20 ' *************   The Monster's Final
   Hour.  ****************************
30 ' ********** An adventure game for Am
  strad CPC464 User Magazine *********
40 ' *********************  By   Steve W
  . Lucas ****************************
50 ' *************************************
  *************************************
60 SYMBOL AFTER 25Ø
7Ø as$="      The Monster's Final Hour.
          "
8Ø at$="An adventure game for the Amstra
  d CPC464"
9Ø aq$=" By   Steve W. Lucas. "
1ØØ MODE 1:INK Ø,26:INK 1,2:INK 2,6: INK
    3,18:PAPER Ø:BORDER Ø
11Ø SYMBOL 252,128,224,Ø,Ø,255,254,252,2
   48
12Ø SYMBOL 251,1,1,1,1,255,127,63,31
13Ø SYMBOL 253,Ø,128,143,241,255,127,3,2
14Ø SYMBOL 254,Ø,Ø,Ø,8,232,252,8,8
15Ø ed$=" "+CHR$(251)+CHR$(252)
16Ø ef$=" "+CHR$(253)+CHR$(254):FOR x=1
   TO 4Ø
17Ø PEN 1:LOCATE x,2:PRINT ed$:LOCATE x,
   4:PRINT MID$(as$,x,1):NEXT:LOCATE 36
   ,2:PRINT"         ";
18Ø PEN 2:FOR x=1 TO 4Ø:LOCATE x,1Ø:PRIN
   T ed$:LOCATE x,12:PRINT MID$(at$,x,1
   ):NEXT:LOCATE 38,1Ø:PRINT"     ";
19Ø PEN 3:FOR x=1 TO 4Ø:LOCATE x,19:PRIN
   T ef$:LOCATE x,21:PRINT MID$(aq$,x,1
   ):NEXT:LOCATE 38,19:PRINT"     ";
2ØØ GOSUB 264Ø
21Ø DIM q$(5Ø),s%(5Ø,4),x$(4Ø),n$(4Ø),n%
   (4Ø),g$(4Ø),v$(5),b%(4Ø)
22Ø RESTORE:FOR x=1 TO 46:READ q$(x):FOR
    y=1 TO 4:READ s%(x,y):NEXT y,x
23Ø FOR x=1 TO 26:READ g$(x),b%(x),n$(x)
24Ø n%(x)=x:NEXT x:p%=13
25Ø DATA in a small backyard. There is a
    disused toilet in one corner. At th
   e far end I  can see a locked gate.,
   Ø,Ø,Ø,Ø
26Ø DATA in a small lounge. There is a l
   arge sofaunderneath the window.,Ø,Ø,
   3,Ø,in a large dining room. There is
    an     enormous highly polished tab
   le in the   centre.,Ø,6,4,2
27Ø DATA in a small kitchen. The sink is
    full of dirty plates and the workto
    ps look as   though they haven't bee
```







```
 n cleaned for    years.,0,7,0,3
280 DATA in a large bedroom. A four post
   er bed   stands at the far end.,0,8,
   0,0,in an oak panelled library. A la
   rge     bookcase covers an entire wa
   ll.,3,0,7,0
290 DATA in a small hallway. A staircase
   pider hangs from a thread above me.,
   0,0,0,27
390 DATA by a large altar. The walls are
    covered with ancient sepulchres.,0,
    31,0,0,inside a small crypt. An old
    woman is   sitting on the floor and
    appears to be  asleep.,30,32,0,0,out
    side a crypt. The entrance is open.,
    0,0,33,44
400 DATA on a dirt track between two row
    s of verytall conifers.,23,34,0,32,b
    y a large metal gate. A sign on the
      gatepost reads 'Pulse Hill Cemetr
    y'.,33,35,0,0,on a dirt track. The w
    ay South leads    towards a gloomy f
    orest.,34,36,0,0
410 DATA on a footpath at the start of t
    he dense forest. Wolves can be heard
     in the       distance.,35,37,40,38,i
    n a small clearing. The forest is to
    o  dense to travel in any direction
    except North.,36,0,0,0
420 DATA lost in a dense forest,38,38,38
    ,38,inside the woodcutter's cottage.
     His     wife sits in a chair reading
     her book   and ignores me.,0,0,0,0
430 DATA outside the woodcutter's cottag
    e. I hearthe sound of someone sawing
    .,0,0,0,36,at the bottom of a freshl
    y dug grave.,0,0,0,0,at the side of
     a freshly dug grave.,0,0,43,34
440 DATA standing on a footpath with tom
    bstones  on either side. One of the
    graves has a vase of flowers on top.
    ,0,0,0,42,on a wide gravel path with
     flower beds  on either side.,0,45,3
    2,0
450 DATA by a granite monolith. A large
    red leverprotrudes from the base.,44
    ,0,0,0,inside a small secret chamber
    . There is a large painting of a wol
    f on one wall.,45,0,0,0
460 DATA a crumpled note,13,note,a small
     key,13,key,a reel of cotton,4,cotto
    n,a lemon,4,lemon,a dustbin,1,dustbi
    n
470 DATA a candle,3,candle,a pen in a ho
    lder,6,pen,a monster strapped to the
     operating      table,19,monster,a sh
    arp scalpel,20,scalpel
480 DATA a bottle,21,bottle,a large leve
    r,22,lever,a rusty padlock,22,padloc
    k,a painting on the wall,8,painting
490 DATA a pair of rubber gloves,5,glove
    s,"",8,map,an old diary,12,diary
500 DATA a stale sandwich,9,sandwich,a s
    pade,28,spade,an ornate coffin,41,co
    ffin,a corpse,41,corpse,a heart,41,h
    eart
510 DATA a screwdriver,39,screwdriver,so
    me gold electrodes,46,electrodes,a l
    arge crucifix,30,crucifix
520 DATA "",8,map,"",1,match
530 n$(25)="crowbar":g$(20)="":g$(21)=""
    :b%(25)=29:g$(25)="a strong crowbar"
    :g$(3)="a needle and thread":n$(3)="
    needle"
540 s%(7,4)=6
550 CLS
560 WHILE rr<99
570 IF p%=19 AND at=1 THEN at=2:PRINT"Th
    e monster spots me. I'd better get o
    utof here!"
580 IF at=2 THEN PRINT"The monster's one
     step behind you!"
590 IF at=2 AND ax=1 THEN x$="The monste
    r catches you and kills you!":GOTO 1
    800
600 IF p%=15 AND ae<>2 THEN x$="You trip
    ped and fell in the dark!":GOTO 1800
610 IF p%=19 AND ar=2 THEN PEN 3:PRINT"T
    he monster is connected to some  gol
    d  electrodes!":PEN 1
620 IF p%=34 AND ak<2 THEN PRINT"To the
    east there is a vicious wolf. It sna
    rls at you!"
630 IF p%=24 AND aj<3 THEN x$="You must
    have missed the path! You sink into
    the bog!":GOTO 1800
640 PRINT:PEN 1:PRINT"You are :-":PEN 2:
    PRINT q$(p%):PRINT:PEN 1:a$="":k=0
650 a%=p%:IF s%(p%,1)>0 THEN a$="North"
660 IF s%(p%,2)>0 AND LEN(a$)>0 THEN a$=
    a$+",South" ELSE IF s%(p%,2)>0 THEN
    a$="South"
670 IF s%(p%,3)>0 AND LEN(a$)>0 THEN a$=
    a$+",East" ELSE IF s%(p%,3)>0 THEN a
    $="East"
680 IF s%(p%,4)>0 AND LEN(a$)>0 THEN a$=
    a$+",West" ELSE IF s%(p%,4)>0 THEN a
    $="West"
690 IF p%=1 THEN a$="In" ELSE IF p%=31 O
    R p%=26 OR p%=4 THEN a$=a$+",Out"
700 IF p%=40 OR p%=25 OR p%=32 THEN a$=a
    $+",In" ELSE IF p%=39 THEN a$="Out"
710 IF p%=16 OR p%=8 THEN a$=a$+",Down"
    ELSE IF p%=17 OR p%=7 THEN a$=a$+",U
    p" ELSE IF p%=41 THEN a$="Up"
720 IF p%=42 AND am>1 THEN a$=a$+",Down"
730 PEN 1:PRINT"You can go :-":PEN 3:PRI
    NT a$:PEN 1:PRINT
740 e=0:FOR t=1 TO 26:pp%=0:IF b%(t)=p%
    THEN pp%=1:GOTO 760
750 NEXT:GOTO 780
760 IF e=0 THEN PRINT"You can see :-":PE
    N 2
770 PRINT g$(t):e=1:GOTO 750
780 PRINT:PEN 1:PRINT"What do you want t
    o do ";:INPUT z$
790 z$=LOWER$(z$):b$=LEFT$(z$,2):c$=LEFT
    $(z$,3):d$=LEFT$(z$,4)
800 PRINT CHR$(7):CLS:PEN 3
810 IF c$="hel" THEN PRINT"I'm sorry I d
    on't have a clue!":k=1 ELSE IF c$="p
    ra" THEN k=1:PRINT"That made me feel
     better!"
820 IF c$="sco" THEN PRINT"You aren't ta
    king this seriously enough.This isn'
    t a game you know!":k=1 ELSE IF c$="
    rem" THEN k=1:GOSUB 2600
830 IF RIGHT$(z$,3)="off" THEN PRINT"How
    dare you speak to me like that!!!!"
    :k=1 ELSE IF c$="rub" THEN k=1:PRINT
    "Don't be absurd!"
```





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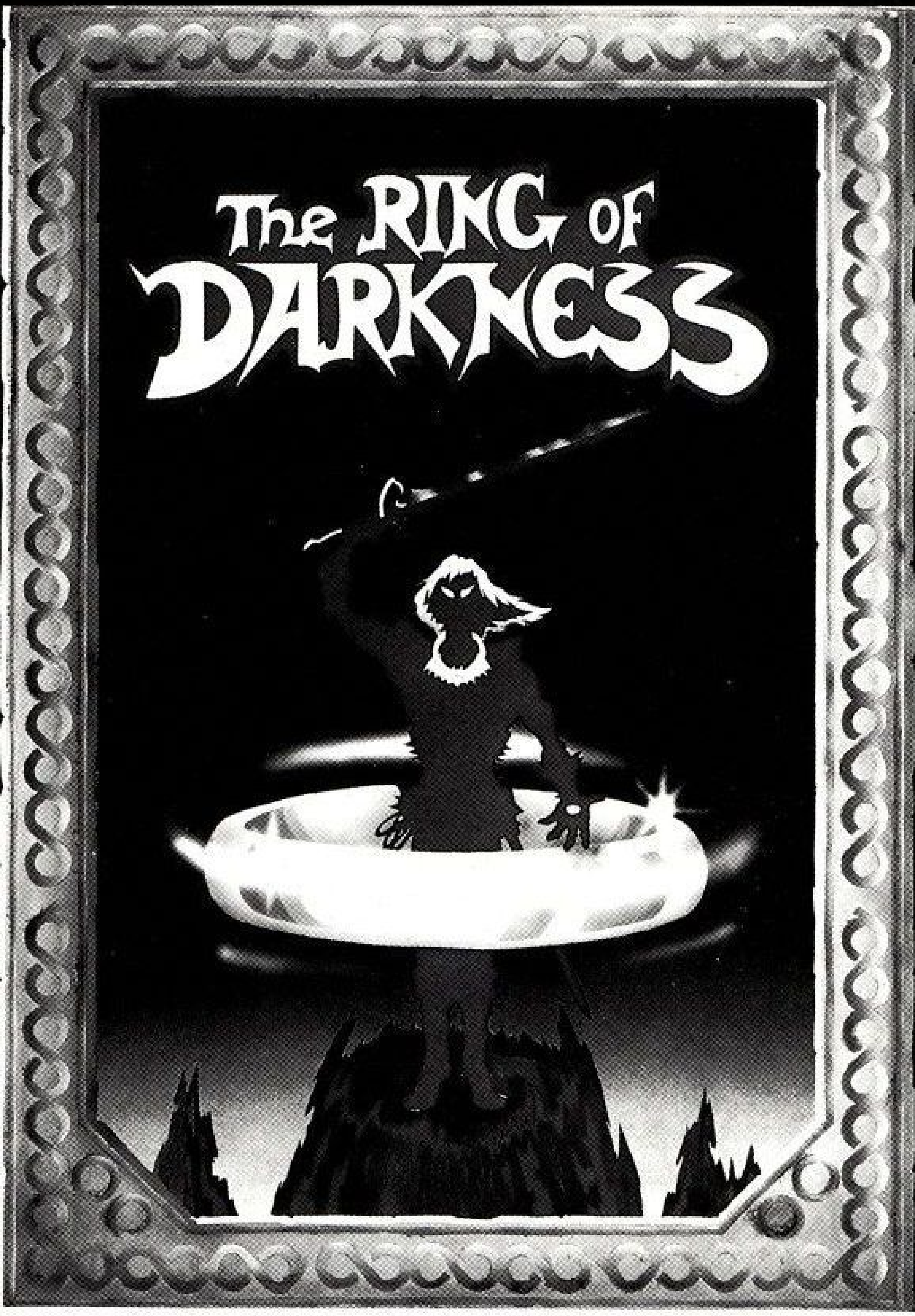
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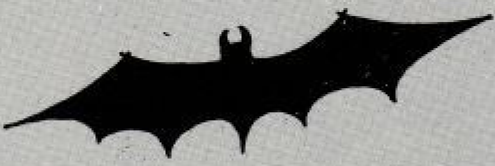
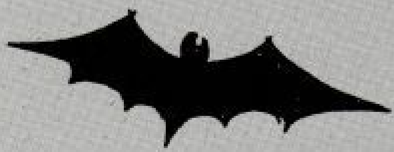
PLEASE RUSH ME:-

QUANTITY	TITLE	COMPUTER

I ENCLOSE MY CHEQUE/P.O. FOR £ . . . .
NAME: . . . .
ADDRESS: . . . .

LISTING

```
840 IF c$="pho" THEN PRINT"You can't do that here!":k=1 ELSE IF c$="rid" THEN k=1:PRINT"What in ?"
850 IF c$="loo" THEN PRINT"There's nothing unusual to see!":k=1 ELSE IF c$="eat" THEN k=1:PRINT"There's no food here!" ELSE IF c$="dri" THEN PRINT"You have nothing to drink!"
860 IF (b$="n" OR d$="go n") AND s%(p%,1)>0 THEN p%=s%(p%,1):k=1
870 IF (b$="s" OR d$="go s") AND s%(p%,2)>0 THEN p%=s%(p%,2):k=1
880 IF (b$="e" OR d$="go e") AND s%(p%,3)>0 THEN p%=s%(p%,3):k=1
890 IF (b$="w" OR d$="go w") AND s%(p%,4)>0 THEN p%=s%(p%,4):k=1
900 IF k=0 AND (b$="n" OR b$="s" OR b$="e" OR b$="w") THEN k=1:PRINT"You can't go that way here!"
910 IF c$="swi" THEN PRINT"Don't be ridiculous! I can't swim here !":k=1 ELSE IF c$="was" THEN PRINT"Don't be absurd!":k=1
920 IF c$="get" OR c$="tak" OR c$="gra" THEN k=1:GOSUB 1120  ELSE IF c$="wea" THEN k=1:GOSUB 2540
930 IF c$="inv" THEN k=1:GOSUB 1490 ELSE IF c$="rea" THEN k=1:GOSUB 1530
940 IF c$="ope" THEN k=1:GOSUB 1630 ELSE IF c$="unl" THEN k=1:GOSUB 1590
950 IF c$="dro" OR c$="lea" THEN k=1:GOSUB 1380 ELSE IF c$="in" OR d$="go i" THEN k=1:GOSUB 1670 ELSE IF c$="out" OR d$="go o" THEN k=1:GOSUB 1700
960 IF c$="up" OR d$="go u" THEN k=1:GOSUB 1720 ELSE IF c$="dow" OR d$="go d" THEN k=1:GOSUB 1740
970 IF c$="sea" THEN k=1:GOSUB 1760  ELSE IF c$="lig" THEN k=1:GOSUB 1770 ELSE IF c$="squ" THEN k=1:GOSUB 1850 ELSE IF c$="dia" THEN k=1:GOSUB 1870
980 IF c$="dig" THEN k=1:GOSUB 1920  ELSE IF c$="uns" OR c$="scr" THEN k=1:GOSUB 1940
990 IF c$="bre" OR c$="sma" THEN k=1:GOSUB 1970 ELSE IF c$="pul" THEN k=1:GOSUB 1990
1000 IF c$="qui" THEN CLS:PRINT"Do you want to save the game <Y/N> ?":GOSUB 2510
1010 IF c$="att" OR c$="kil"  THEN k=1:GOSUB 2060 ELSE IF c$="cut" OR c$="sta" THEN k=1:GOSUB 2090 ELSE IF c$="fit" OR c$="ins" OR c$="fix" THEN k=1:GOSUB 2140
1020 IF c$="con" THEN k=1:GOSUB 2210  ELSE IF c$="sew" THEN k=1:GOSUB 2190 ELSE IF c$="say" OR c$="tal" OR c$="ask" THEN k=1:PRINT"Do you like talking to yourself ?"
1030 IF c$="loa" THEN GOSUB 2420
1040 IF c$="row" OR c$="sai" THEN PRINT"What a silly suggestion that is!":k=1 ELSE IF c$="wai" THEN k=1:PRINT"O.K.":FOR x=1 TO 1000:NEXT x
1050 IF c$="jum" THEN x$="You jump but unfortunately, you miss    your footing, slip and break your neck!":GOSUB 1800
1060 IF c$="kis" OR c$="rub" OR c$="dan" THEN PRINT"What a stupid idea!":k=1
1070 IF c$="sav" THEN GOSUB 2320
1080 IF p%=a% THEN ax=1 ELSE ax=0
1090 IF k=0 THEN PRINT"I'm sorry I don't seem to understand you";
1100 IF p%=24 AND at=2 THEN GOTO 2270
1110 WEND
1120 GOSUB 1330
1130 IF l%<1 THEN RETURN
1140 e%=0:FOR h=1 TO 26:IF b%(h)=p% AND b%(n%(r))=p% THEN e%=1
1150 NEXT h: IF e%=0 THEN PRINT"I don't see it here. (Maybe I need      glasses!)":RETURN
1160 IF r=1 THEN aa=1 ELSE IF r=2 THEN ab=1
1170 IF r=3 AND ac=0 THEN ac=1 ELSE IF r=4 THEN ad=1 ELSE IF r=6 THEN ae=1 ELSE IF r=9 THEN af=1
1180 IF r=13 AND p%=8 AND ag=0 THEN ag=1:q$(8)=q$(8)+"  There is a safe on the wall!":g$(13)="a painting of Victor Frankenstein"
1190 IF r=7 AND ah=0 THEN ah=1:PRINT"A secret panel slides to one side!":q$(6)=q$(6)+" A secretpanel has opened.":s%(6,4)=15
1200 IF r=14 THEN az=1
1210 IF r=26 THEN ai=1 ELSE IF r=8 THEN x$="Two hands reach for your throat. Aagghh!":GOSUB 1800
1220 IF r=12 THEN PRINT"It's locked around the lever!":RETURN ELSE IF r=11 THEN PRINT"That would be foolish!":RETURN
1230 IF r=15 AND aj=0 THEN aj=1 ELSE IF r=17 AND ak=0 THEN ak=1
1240 IF r=17 AND ak=2 THEN RETURN
1250 IF r=18 THEN am=1 ELSE IF r=22 THEN an=1
1260 IF r=19 THEN PRINT"It's too heavy!":RETURN ELSE IF r=20 THEN PRINT"I can't carry it!":RETURN ELSE IF r=21 AND an<3 THEN PRINT"I can't do that yet!":RETURN
1270 IF r=16 THEN ao=1 ELSE IF r=25 THEN ap=1 ELSE IF (r=23 AND ar=0) THEN ar=1 ELSE IF (r=21 AND as=0) THEN as=1
1280 e%=0:FOR d=1 TO 5
1290 IF v$(d)="" THEN v$(d)=g$(n%(r)):e%=1:d=6
1300 NEXT:IF e%=0 THEN PRINT"I'm sorry my hands are full!":RETURN
1310 b%(n%(r))=0
1320 RETURN
1330 l$="":FOR h=1 TO LEN(z$)
1340 IF MID$(z$,h,1)=" " THEN l$=RIGHT$(z$,(LEN(z$)-h)):h=100
1350 NEXT h:r=0:l%=0:IF LEN(l$)<2 THEN RETURN
1360 FOR h=1 TO 26:IF LEFT$(n$(h),LEN(l$))=l$ THEN l%=1:r=h
1370 NEXT:RETURN
1380 GOSUB 1330: IF l%<>1 THEN PEN 2:PRINT"You can't see a ";l$;" here!":RETURN
1390 e%=0:FOR d=1 TO 5:IF v$(d)=g$(n%(r)) THEN v$(d)="":e%=1
```





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A powerful and virtually full implementation of Standard Pascal. A valuable educational and development tool in an incredibly small size (19K) for such a complete language compiler, compiles directly to Z80 code which executes very quickly, typically at least 40 times faster than the BASIC equivalent. INTEGERs, REALs, CHARs, ARRAYs, SETs, RECORDs, POINTERs, IF . . . THEN . . . ELSE, CASE . . . OF, WHILE . . . DO, REPEAT . . . UNTIL, FOR . . . DO, fully recursive procedures and functions, value and variable parameters etc. etc. So much that you will not believe it. You MUST write for details.

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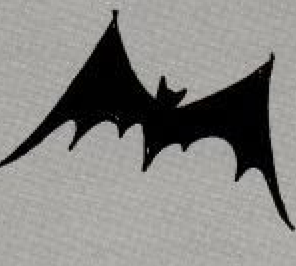
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```
1400 NEXT:IF e%<1 THEN PRINT"You aren't
    carrying it!":RETURN
1410 b%(n%(r))=p%
1420 IF r=1 THEN aa=0 ELSE IF (r=2 AND a
    b=1) THEN ab=0 ELSE IF (r=3 AND ac=
    1) THEN ac=0
1430 IF r=4 THEN ad=0 ELSE IF r=6 THEN a
    e=0 ELSE IF r=9 THEN af=0 ELSE IF r
    =10 THEN X$="The bottle breaks and
    You are sprayed   with acid !!  AAA
    ggghhh !!!!":GOSUB 1800
1440 IF r=14 AND az=1 THEN az=0
1450 IF r=26 THEN ai=0 ELSE IF (r=15 AND
     aj=1) THEN aj=0  ELSE IF (r=17 AND
     ak=1 AND p%=34) THEN ak=2:s%(34,3)
    =42:PRINT"The wolf eats it and runs
     away!":g$(17)="":B%(17)=0 ELSE  IF
     r=17 THEN ak=0
1460 IF r=18 AND am=1 THEN am=0 ELSE IF
    (r=22 AND an=1) THEN an=0 ELSE IF r
    =16 THEN ao=0 ELSE IF r=25 THEN ap=
    1
1470 IF r=23 AND ar=1 THEN ar=0 ELSE IF
    r=21 AND as=1 THEN as=0
1480 RETURN
1490 PEN 1:PRINT"You are carring :-":PEN
     2: IF az=2 THEN PRINT"A pair of ru
    bber gloves (worn)"
1500 f%=0:FOR h=1 TO 5:IF v$(h)<>"" THEN
     PRINT v$(h):f%=1
1510 NEXT:IF f%=0 AND az<2 THEN PRINT"No
    thing at all!"
1520 RETURN
1530 GOSUB 1330:IF p%=23 AND LEFT$(l$,3)
    ="sig" THEN PRINT TAB(8);"The signp
    ost reads :-":PEN 2:PRINT:PRINT TAB
    (10);"'BEWARE OF THE BOG'":RETURN
1540 IF p%=23 AND aj=1 AND r=15  THEN PR
    INT"I think You could follow the pa
    th now !":aj=3 ELSE IF r=15 THEN PR
    INT"not here!" :RETURN
1550 IF p%=23 AND aj=0 THEN PRINT"You ha
    ven't got the map!":RETURN ELSE IF
    p%=23 THEN RETURN
1560 IF LEFT$(l$,3)="dia" AND ao=1 THEN
    PRINT"The diary reads :-":PEN 2:PRI
    NT:PRINT"April 1st. 1895":PEN 1:PRI
    NT"The monster must be destroyed":P
    EN 3:PRINT"Find electrodes, bring i
    t back to life  and take to it to t
    he bog!":RETURN
1570 IF aa=1 AND LEFT$(l$,3)="not" THEN
    PRINT"The note reads :-":PEN 2:PRIN
    T"As my sole living heir, I am trus
    ting   you with a dangerous mission
    . DESTROY   THE MONSTER!":RETURN
1580 IF LEFT$(l$,3)="not" THEN PRINT"You
     haven't got it!":RETURN ELSE IF LE
    N(l$)<2 THEN PRINT"What do you want
     to read?":RETURN ELSE PRINT"You ca
    n't read that!":RETURN
1590 IF p%=8 AND ag>0 THEN PRINT"You don
    't know the code for the lock!":RET
    URN
1600 IF p%<>13 THEN PRINT"You can't do t
    hat here!":RETURN
1610 IF ab<1 THEN PRINT"You need the key
    !":RETURN
1620 PRINT"O.K.":ab=2:RETURN
1630 IF p%=41 THEN GOSUB 1940:RETURN
1640 IF p%=8 AND ag>0 THEN PRINT"You don
    't know the code for the lock!":RET
    URN
1650 IF p%<>13 THEN PRINT"Not here!":RET
    URN
1660 IF ab<2 THEN PRINT"It's locked!":RE
    TURN ELSE PRINT"O.K.":s%(13,1)=7:RE
    TURN
1670 IF p%=13 AND ab<2 THEN PRINT"The do
    or is locked!!":RETURN ELSE IF p%=1
    3 THEN p%=7:PRINT"O.K.":RETURN
1680 IF p%=1 THEN p%=4:PRINT"O.K.":RETUR
    N ELSE IF p%=25 THEN p%=26:PRINT"O.
    K.":RETURN ELSE  IF p%=40 THEN p%=3
    9:PRINT"O.K.":RETURN
1690 IF p%=32 THEN p%=31:PRINT"O.K.":RET
    URN  ELSE PRINT"You can't do that h
    ere !":RETURN
1700 IF p%=26 THEN p%=25:PRINT"O.K.":RET
    URN  ELSE IF p%=39 THEN p%=40:PRINT
    "O.K.":RETURN ELSE IF p%=31 THEN p%
    =32:PRINT"O.K.":RETURN ELSE IF p%=4
     THEN p%=1:PRINT"O.K.":RETURN ELSE
    IF p%=7 THEN p%=13:PRINT"O.K.":RETU
    RN
1710 PRINT"Do you have to be so stupid ?
    ":RETURN
1720 IF p%=41 THEN p%=42:PRINT"O.K.":RET
    URN
1730 IF p%=17 THEN p%=16:PRINT"O.K.":RET
    URN ELSE IF p%=7 THEN p%=8:PRINT"O.
    K.":RETURN ELSE PRINT"Don't be stup
    id!":RETURN
1740 IF p%=42 AND am<2 THEN PRINT"You wi
    ll need to dig a hole first!":RETUR
    N ELSE IF p%=42 THEN p%=41:PRINT"O.
    K.":RETURN
1750 IF p%=16 THEN p%=17:PRINT"O.K.":RET
    URN  ELSE IF P%=8 THEN p%=7:PRINT"O
    .K.":RETURN ELSE PRINT"Don't be abs
    urd!":RETURN
1760 IF p%=1 AND ai=0 THEN PRINT"You can
     see something amongst all the   ru
    bbish!":g$(26)="a box of matches":R
    ETURN  ELSE PRINT"You didn't find a
    nything here!":RETURN
1770 IF ae<1 THEN PRINT"How are you goin
    g to do that ?":RETURN ELSE IF ai<1
     THEN PRINT"You don't have anything
     to do that with!":RETURN
1780 PRINT"O.K.":FOR x=1 TO 5:IF v$(x)=g
    $(6) THEN v$(x)=g$(6)+" (lit)"
1790 NEXT:g$(6)=g$(6)+" (lit)":ae=2:RETU
    RN
1800 CLS:PEN 1:LOCATE 1,1:PRINT x$ :GOSU
    B 2640
1810 PEN 2:LOCATE 10,10:PRINT"You are  <
    < DEAD >>"
1820 PEN 3:LOCATE 4,20:PRINT"Would you l
    ike another game <y/n> ?"
1830 d$=INKEY$:d$=LOWER$(d$):IF d$="y" T
    HEN RUN ELSE IF d$<>"n" THEN 1830
1840 CLS:PEN 1:PRINT"Goodbye. Thank you
    for playing.":END
1850 IF ad<>1 THEN PRINT"You have nothin
    g worth squeezing!":RETURN ELSE IF
    aa<>1 THEN PRINT"A few drops of lem
    on juice fall to the  floor!":RETUR
    N
1860 al=2000+INT(RND(1)*2000):PRINT"You
    squeeze the lemon and some juice
     lands on the note. A message appea
```





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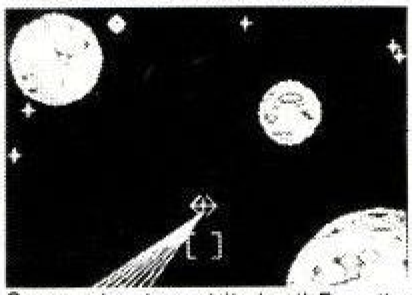
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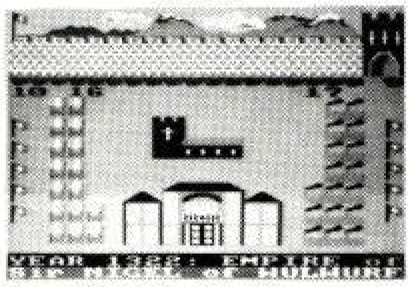
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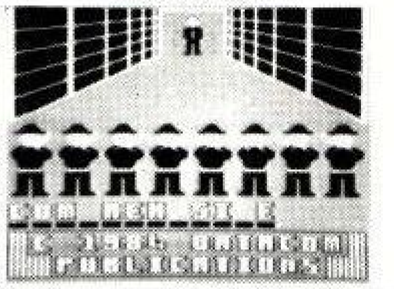
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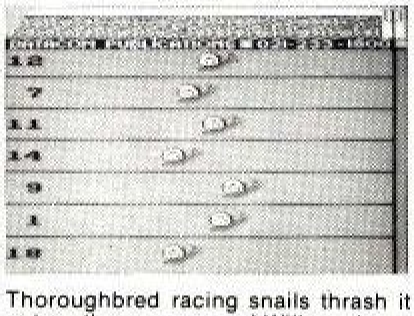
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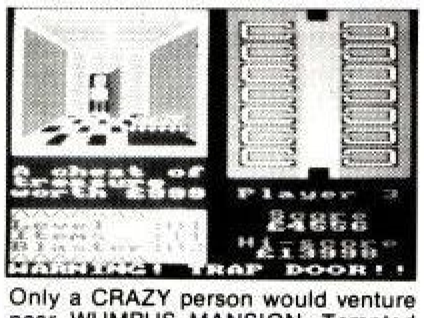
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SNAIL PACE		
EMPIRE		
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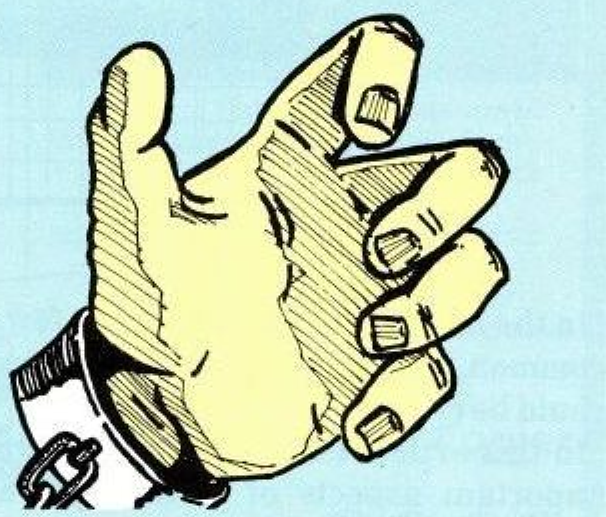
Ring: DAVID READING on 021-233 1800 for our excellent terms.

```
   rs :-":PEN 2:PRINT"To open the safe
    DIAL :- ";al:RETURN
1870 IF p%<>8 THEN PRINT"You can't do th
   at here DUMMY!":RETURN
1880 IF ag<>1 THEN PRINT"How?":RETURN
1890 PEN 2:PRINT"What number do you want
    to dial ";:PEN 3:INPUT ba:IF ba<>a
   l THEN PRINT"That combination doesn
   't work!":RETURN
1900 IF al=0 THEN PRINT"That's not the r
   ight combination!":RETURN
1910 PRINT"The safe opens!":g$(15)="an o
   ld map showing a secret path throug
   hthe bog!":RETURN
1920 IF am<1 THEN PRINT"You haven't got
   a spade!":RETURN  ELSE IF p%<>42 TH
   EN PRINT"You can't do that here!":R
   ETURN
1930 PRINT"You dig down to the coffin!":
   am=2:RETURN
1940 IF p%<>41 THEN PRINT"I can't do tha
   t here!":RETURN
1950 IF an<1 THEN PRINT"You need a screw
   driver!":RETURN ELSE IF an>1 THEN P
   RINT"It's already open!":RETURN
1960 PRINT"You open the coffin and insid
   e there is a half decomposed corpse
   !":g$(20)="a corpse":g$(19)="an ope
   n coffin":an=2:RETURN
1970 IF ap<>1 THEN PRINT"You haven't any
   thing to do that with!":RETURN ELSE
    IF p%<>22 THEN PRINT"You can't do
   that here!":RETURN
1980 IF aq<1 THEN aq=1:PRINT"That's done
    the trick!":g$(12)="a broken padlo
   ck":RETURN ELSE PRINT"You have alre
   ady done that!":RETURN
1990 IF p%=22 AND aq<1 THEN PRINT"You ca
   n't move it. It's locked!":RETURN E
   LSE IF p%=22 AND ar<2 THEN PRINT"Yo
   u should connect the electrodes fir
   st!":RETURN
2000 IF p%=22 AND as<2 THEN PRINT"You wi
   ll need to find a new heart for   t
   he monster first!":RETURN
2010 IF p%=22 AND ac<3 THEN PRINT"The mo
   nster hasn't been sewn up yet!":RET
   URN
2020 IF p%=22 THEN at=1:PRINT"The monste
   r comes to life and staggers  from
   the table!":g$(8)="a menacing monst
   er":RETURN
2030 IF p%=45 AND az<>2 THEN x$="a surge
    of power flows through your body!"
   :GOSUB 1800
2040 IF p%=45  THEN PRINT"A small openin
   g appears !":s%(45,2)=46:RETURN
2050 PRINT"There's nothing here to pull!
   ":RETURN
2060 IF p%=19 THEN x$="The monster's han
   ds clamp firmly around your throat
   !":GOSUB 1800
2070 IF p%=34 THEN x$="You try to kill i
   t but the wolf is too  quick and it
   s teeth sink into your neck !":GOSU
   B 1800
2080 PRINT"I see no need of violence her
   e!":RETURN
2090 IF p%<>41 THEN PRINT"There isn't mu
   ch point in doing that    here!":RE
   TURN
2100 IF af<>1 THEN PRINT"You don't have
   anything sharp enough!":RETURN
2110 IF an=3 THEN PRINT"Not again!":RETU
   RN
2120 an=3:PRINT"I'll have to close my ey
   es whilst you dothis as I can't sta
   nd the sight of      blood!"
2130 g$(20)="a mutilated corpse":g$(21)=
   "a fresh heart":RETURN
2140 IF p%<>19 THEN PRINT"You can't do t
   hat here!":RETURN
2150 IF as=2 THEN PRINT"You've already d
   one that!":RETURN
2160 PRINT"You fit the new heart into th
   e monster. You will need to sew it
   up now!":g$(8)=g$(8)+" (with a new
   heart fitted)"
2170 FOR x=1 TO 5:IF v$(x)=g$(21) THEN v
   $(x)=""
2180 NEXT:as=2:RETURN
2190 IF ac<1 THEN PRINT"You have no thre
   ad!":RETURN
2200 IF ac=3 THEN PRINT"You've already d
   one that!":RETURN ELSE IF as<2 THEN
    PRINT"You haven't fitted the heart
    yet!":RETURN ELSE ac=3:PRINT"O.K.
   You sew the monster up!":RETURN
2210 IF p%<>19 THEN PRINT"What an absurd
    suggestion!":RETURN ELSE IF ar<1 T
   HEN PRINT"How are you going to do t
   hat ?":RETURN
2220 IF ar=2 THEN PRINT"You have already
    attached the electrodesto the mons
   ter!":RETURN
2230 PRINT"You connect the electrodes to
    the evil  monster!":ar=2
2240 FOR x=1 TO 5:IF v$(x)=g$(23) THEN v
   $(x)=""
2250 NEXT:RETURN
2260 REM ** win game **
2270 CLS:PEN 1:LOCATE 6,2:PRINT"The mons
   ter sinks into the bog!"
2280 LOCATE 1,10:PEN 2:PRINT"You have ri
   d the world of this evil     creatu
   re for ever.  Well Done!"
2290 GOSUB 2640
2300 LOCATE 3,20:PEN 3:PRINT"Would you l
   ike to play again <Y/N>  ? "
2310 a$=INKEY$:a$=LOWER$(a$):IF a$="y" T
   HEN RUN ELSE IF a$="n" THEN CLS:PEN
    1:PRINT"Goodbye.....Thank you for
   playing!":END ELSE 2310
2320 k=1:PEN 2:PRINT"Please insert tape
   or disc now!"
2330 OPENOUT "data"
2340 FOR z=1 TO 46:PRINT#9,q$(z):FOR d=1
    TO 4:PRINT#9,s%(z,d):NEXT d,z
2350 FOR z=1 TO 5:PRINT#9,v$(z):NEXT z
2360 FOR z=1 TO 26:PRINT#9,g$(z):PRINT#9
   ,b%(z):PRINT#9,n$(z):PRINT#9,n%(z):
   NEXT z
2370 PRINT#9,a%,b%,c%,d%,e%,f%,g%,h%,i%,
   j%,k%,l%,m%,n%,o%,p%,q%,r%,s%,t%,u%
   ,v%,w%,x%,y%,z%
2380 PRINT#9,aa,ab,ac,ad,ae,af,ag,ah,ai,
   aj,ak,al,am,an,ao,ap,aq,ar,as,at,au
   ,av,aw,ax,ay,az
2390 CLOSEOUT
2400 PRINT"Data file has been created
2410 RETURN
2420 k=1:PEN 2:PRINT"Please insert tape
```

```
    or disc now!"
2430 OPENIN "data"
2440 FOR z=1 TO 46:INPUT #9,q$(z):FOR d=
    1 TO 4:INPUT #9,s%(z,d):NEXT d,z
2450 FOR z=1 TO 5:INPUT #9,v$(z):NEXT z

2460 FOR z=1 TO 26:INPUT#9,g$(z):INPUT #
    9,b%(z):INPUT #9,n$(z):INPUT#9,n%(z
    ):NEXT z
2470 INPUT #9,a%,b%,c%,d%,e%,f%,g%,h%,i%
    ,j%,k%,l%,m%,n%,o%,p%,q%,r%,s%,t%,u
    %,v%,w%,x%,y%,z%
2480 INPUT #9,aa,ab,ac,ad,ae,af,ag,ah,ai
    ,aj,ak,al,am,an,ao,ap,aq,ar,as,at,a
    u,av,aw,ax,ay,az
2490 CLOSEIN
2500 PRINT"O.K.":RETURN
2510 af$=INKEY$:af$=LOWER$(af$):IF af$="
    n" THEN CLS:PEN 1:PRINT"Goodbye...
    Thank you for playing.":END
2520 IF af$="y" THEN GOSUB 2320:PRINT"Da
    ta file saved.":PEN 1:PRINT:PRINT:P
    RINT"Goodbye. Thank you for playing
    !":END
2530 GOTO 2510
2540 GOSUB 1330: IF r<>14 THEN PRINT"You
     can't wear ";l$:RETURN
2550 IF az<1 THEN PRINT"You don't have t
    hem!":RETURN
2560 IF az>1 THEN PRINT"You are already
    wearing them!"
2570 az=2:FOR x=1 TO 5:IF v$(x)=g$(14) T
    HEN v$(x)=""
2580 NEXT:g$(14)=""
2590 PRINT"O.K.":RETURN
2600 GOSUB 1330:IF r<>14 THEN PRINT"You
    aren't wearing ";l$:RETURN
2610 IF az<2 THEN PRINT"You aren't weari
    ng them!":RETURN
2620 PRINT"They won't come off your hand
    s!":RETURN
2630 DATA 478,478,426,478,379,478,478,42
    6,379,358,319,478,478,426,379,358,3
    19,478,478,426,478,319,478,284,478,
    253,478,253,284,319,358,379,426,478
    ,506,568
2640 RESTORE 2630:FOR x=1 TO 34:READ d:S
    OUND 7,d,20,7:NEXT: RETURN
```





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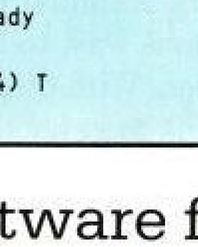
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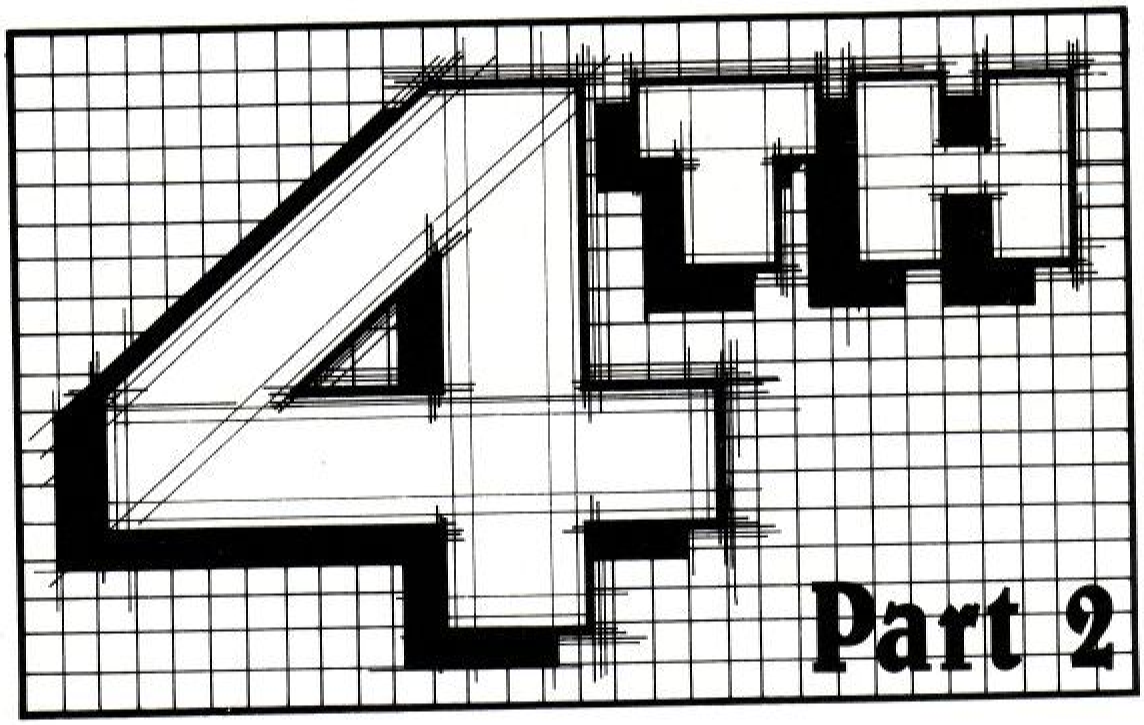
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In the last article we looked at a few of the more common Forth words, and also how a new word could be created.

In this article I shall be covering the two most important aspects of forth-stack, and *reverse polish notation.*

The Forth Stack

Forth actually maintains two stacks which both work on the usual LIFO principle - Last In First Out. The *PARAMETER* stack is where all calculations and operations are carried out, whilst the *RETURN* stack is a conventional subroutine return stack where Forth stores various addresses and linkage information. In most other languages, apart from machine code programming, the operating system will take care of all stack operations leaving the programmer free of such worries.

In Forth, however, it is the programmers responsibility to manipulate the stacks. This means that a little more thought needs to be given whilst programming. The advantage of this though, is that Forth will run a lot quicker than most other high level languages.

Before taking a look at how the parameter stack is manipulated type in the following two new words into your Forth dictionary:

```
: PEEK CR CR 1+ SWAP
  DO I CØ . LOOP CR CR ;

: .S CR CR SP@ SØ @ OVER OVER = IF
  2DROP . "EMPTY STACK"ELSE
  SWAP DO I @ . 2 +LOOP
  ENDIF CR CR ;
```

Don't worry if you can't understand them - you soon will.

PEEK is similar to the PEEK in BASIC. It's used in the same way, to have a look at whats in a memory loaction. With this Forth version though all you need to do is to enter the start and end addresses of the locations that you would like to PEEK at, followed by the word PEEK. For example: to display the first 100 memory loctions you would type:

```
1 1ØØ PEEK
```

The contents of the first 100 memory locations will then be printed out. The second word is .S which is called 'print-stack' in Forth. This word prints out the contents of the parameter stack, and, most important of all, it will leave the contents of the stack unchanged. Most of the difficulty in learning Forth will be centered arount getting the correct values onto the stack and in the correct position. .S as you will soon discover will be an absolute godsend to you.

Failing to leave a space between words or putting in a space where there should not be one, is the most common cause of 'syntax' errors with Forth.

Be careful with the fourth (!) word on the first line of .S. This is pronounced S-zero; it is the number Ø and not a captial '0'. Before starting, it would be a good idea to clear the stack (the stack 'pointer' is reset) by typing SP!. If you type .S you should get the message EMPTY STACK OK appear. Now type in a couple of number say 12 and 25. Forth first checks its dictionary to see if these numbers are words (some numbers are words) and if not, the numbers will be placed onto the stack - providing they are legitimate numbers. Type .S and you should get the numbers 25 12 printed out.

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The leftmost number is always the number that is on top of the stack (referred to as TOS). Forth actually holds its numbers in 16 bits (2 bytes) on the stack. The range of numbers is therefore from -32768 to 65535. The Forth word "." (full stop) is used to print the number that is TOS as a signed number - from -32768 to 32767. Numbers between 32768 and 65535 will be printed out in their two's complement form. If you wish to print the number out as an *unsigned* integer then the word U. is used. Forth can also handle numbers 32 bits wide giving a much larger range -from −2,147,483,648, to +2,147,483,647 but I shall not be dealing with these in this article.

By using .S you will be able to see the effects of the most commonly used stack operatives. These are as follows:

```
DUP
```

This word will duplicate the number that is presently TOS. Starting with an empty stack, if you enter 12 `DUP .S` you will get 12 12 printed out.

`DUP` is used extensively in Forth. When a number that is TOS is printed out, or a test is done on it, then it is removed from the stack. If you need to use the number again, which is often the case, then you must `DUP` it to keep a copy of it on the stack. The word `2DUP` or preferably `DDUP` can be created which will copy a 32 bit number that is TOS as follows:

```
: DDUP OVER OVER ;
```

```
DROP
```

As its name implies, the number that is TOS is discarded. Try typing `DROP .S` and you should now see just `12` printed.

```
SWAP
```

To see the effect of this first enter another number besides the 12 that is TOS at the moment - say 19 . .S will now show `19 12` `SWAP` exchanges the value that is TOS (19) with the value beneath it (12). If you now enter `SWAP. .S` you should get `12 19` . The two values have indeed been exchanged

```
OVER
```

This word duplicates the second value on the stack, onto the TOS. So if you enter `OVER .S` you should now see `19 12 19`.

```
ROT
```

This word brings the third item on the stack to the TOS. If you enter `ROT .S` now you should get `19 19 12`.

The words just shown are the most commonly used words for manipulating the numbers near the TOS. There are other words which will be discussed later.

It is considered good practice in FORTH to keep the total of numbers on the stack fairly small - one reason why is that most of the stack operatives only work on the top three stack numbers. If you have more than three numbers on the stack then the word `PICK` can be used.

Unfortunately the version of Forth on the Amstrad does not support the word `PICK`. However, like everything in Forth - in you've not got it, then you can soon add it to the dictionry. To create `PICK` type:

```
: PICK DUP 1 < IF ."PICK value to SMALL "
DROP ELSE 2 * SP0 + @THEN ;
```

To use the word `PICK` then type in the position of the number that you want `PICK`ed from the stack. For example, if you had the numbers `12 18` and `30` on the stack then:

```
3 PICK
```

would copy 30 to the TOS giving 30 12 18 30 on the stack. `1 PICK` would produce the same result as `DUP` , `2 PICK` would act the same as the word `OVER`.

You may find it strange to say `3 PICK` as you would probably think that `PICK 3` would be more logical (`PICK` the third item off the stack). This brings us nicely onto the infamous *reverse polish* notation which Forth is renowned for!

In BASIC you would say:

```
PRINT 8 + 4
```

In Forth you say:

```
8 4 + .
```

The Forth version appears to be 'back to front' -hence the name *'reverse'. polish* comes from some mathematician who came from Poland - its got nothing to do with what you put on your shoes!!

It is also known as the *postfix* method, whereas BASIC uses the *infix* method. With the *postfix* method the operators come *after* the parameters. This happens to fit in nicely with the way that Forth manipulates its stacks, although it should be noted that most computers work with the *postfix* method, and waste much time in converting from *infix* to *postfix*.

Looking at the above example then the values 8 and 4 will beplaced on the stack, the '+' operator is a Forth word which takes the top two items off the stack, adds them together, then places the result back on the top of the stack. The FORTH print word '.' takes the value on

TOS and prints it out. All very simple. One advantage of the POSTFIX notation is that it removes the need for parenthesis. Consider the following in BASIC:

```
PRINT 3 + 4 * 5 + 6
```

The answer is 29, but only because the '*' operator has precedence over the '+' operator. If you wanted to multiply the sum of 3 + 4 with the sum of 5 + 6, you would have to say:

```
PRINT (3 + 4) * (5 + 6)
```

The sums in parenthesis are calculated first, giving the answer 77.

In Forth you would say:

```
3 4 + 5 6 + * .
```

The answer will be the same...77, with no parenthesis needed.

The effect on the stack is shown in diagram 1.

It may seem strange, but is is a more efficient way and you will soon get used to it. There are many other mathematical operators in Forth although I don't intend to dwell on them as there are many other things to cover. Experiment with the various operators, and use .S to see the effect on the stack.

One interesting aspect of Forth is that you can work in any number base that you like - from 2 to 255 The word **BASE** is known in Forth as a 'user' variable. When you type **BASE** the address of the variable **BASE** is left on the stack. By setting **BASE** to a value you can work in any number base. **HEX** is a standard Forth word which sets **BASE** to 16. If you type **HEX** then all numbers input or output will be treated as Hexadecimal -there's no need to use the prefix '&' as in BASIC!

Binary (base 2) and Octal (base 8) could easily be set up by the following new words:

```
: BINARY 2 BASE C! ;
: OCTAL 8 BASE C! ;
```

The value to set **BASE** to is put on the stack first. The word **BASE** then places the address of **BASE** onto the stack. C! is a Forth word that stores the byte that is second on the stack to the address that is TOS. In effect it is the same as the BASIC **POKE**. Try out binary and octal and see their effect. One word of warning. If you are working in **BINARY** then any values that you enter must be in **BINARY**. Only the numbers 0 1 will be accepted. To return to the normal Base 10 then just type **DECIMAL** - another standard Forth word.

Finally for this month, here is a useful new word which will take the number off the top of the stack and print it out in binary, decimal and hexadecimal, regardless of the current Base that you are working in. Make sure that you have also added the new word **BINARY** as this is used in the new word definition.

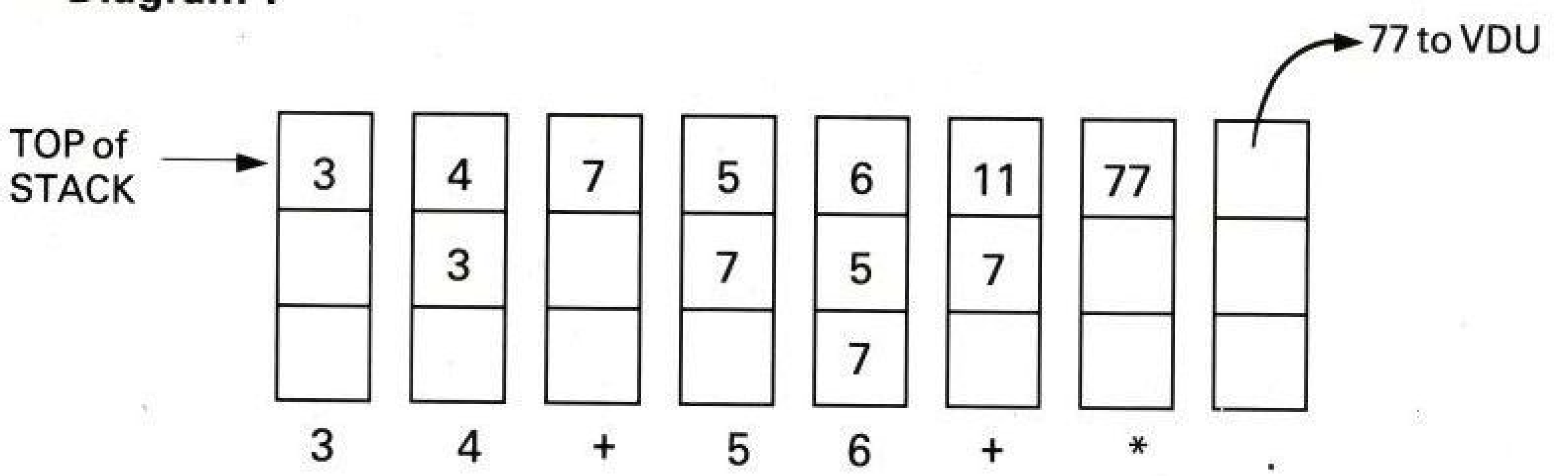
Next month we will take a look at Loops such as

REPEAT...UNTIL, DO...LOOP, BEGIN...WHILE...AGAIN, and at the Forth control structures **IF...ELSE...ENDIF.**

New word .N to print number on TOS as Binary, Decimal & Hexadecimal.

```
: .N BASE CØ >R BINARY DUP CR CR
  ."BIN="U. CR DECIMAL DUP
  ."DEC="U. CR HEX DUP
  ."HEX="U. CR CR
  R> BASE C! ;
```

Diagram 1

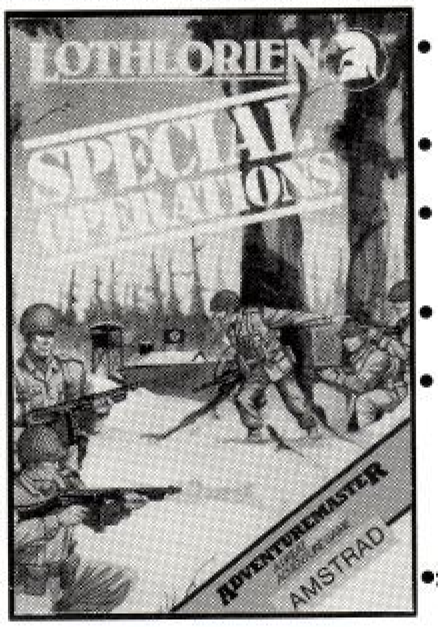


THE STACK EFFECT OF 3 4 + 5 6 + * . IN FORTH

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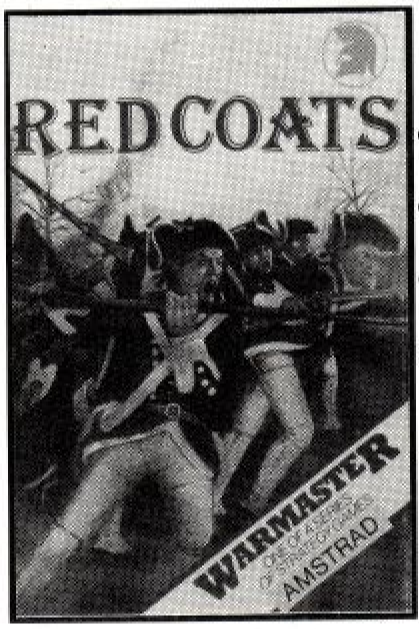
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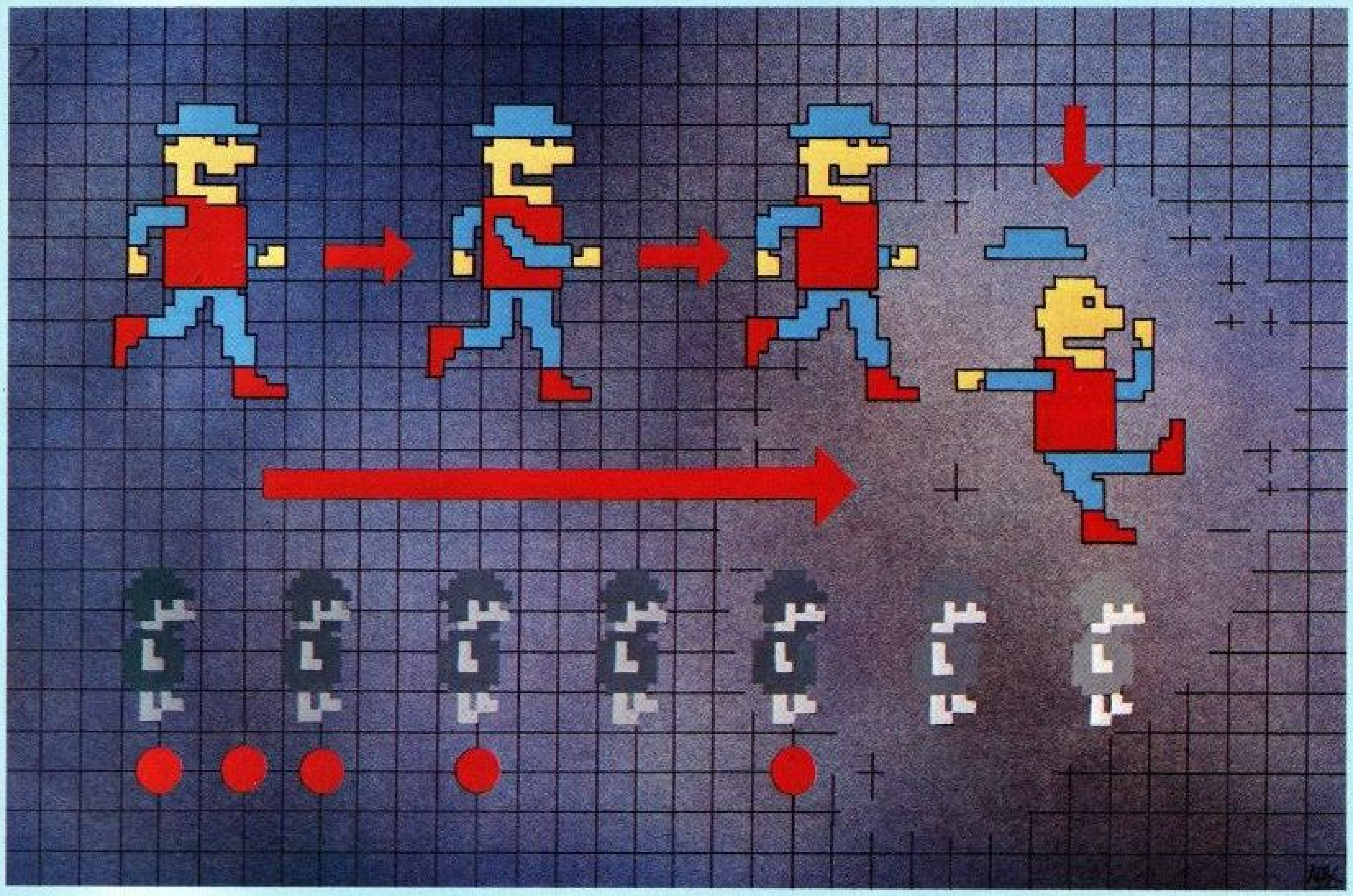
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MACHINE CODE ACTION

1: SIMPLE SPRITES



This is the first of three articles in which I hope to introduce you to the delights of machine coding on the CPC 464. Delights?? Oh, yes! Machine code is harder to use than BASIC, but the dramatic improvement makes it well worth the effort. In this issue, we will tackle the routines needed to put a single character 'sprite' on screen and control its movement from the keyboard. Later, we will come to other routines and combine them to make a shoot-'em-up game. Machine code is essentially about handling numbers, storing, comparing and manipulating them, and about controlling the program flow. The Z80 chip, the heart of the CPC 464, processes these numbers through the registers. There are 2 blocks of these, each containing 4 sets of 2 bytes.

```
A  F     A' F'
B  C     B' C'
D  E     D' E'
H  L     H' L'
```

The *alternate* registers (A'F',etc) need not concern us - they are mainly left for the machine's own use. The registers can be used singly to store

Figure 1

```
1,0,255     LD BC,65280     Load 0+256*255 into the BC register
11          DEC BC          BC=BC-1
120         LD A,B          Load A with the number in B
177         OR C            OR the number in A with the number in C
32,251      JR NZ,-5        Jump back 5 if Not Zero
```

Figure 2

```
33,12,20        LD HL,12,20     Put 12 into L and 20 into H
205,117,187     CALL &BB75      Call up the TXT SET CURSOR routine
62,42           LD A,42         Load A with the code for '*'
205,93,187      CALL &BB5D      Call up the TXT WR CHAR routine
```

one-byte numbers (0-255), or in pairs, BC, DE or HL, to store larger numbers (0-65535). The A register, also called the *accumulator*, is rather special. This is where most of the arithmetic is done, and where numbers most be placed before they can be compared with other numbers. The F register is also unusual. The bits of this byte are used as FLAGS to signal what is happening in the accumulator. You can see the registers in action in Figure 1. It's a delay loop -see if you can spot it one the main listing. The first column contains the numbers which need to be POKEd into the memory; the second shows the Z80 mnemonics, the half-way house between words and numbers that is used by an ASSEMBLER.

The largest number that you can put into a byte is 255, &FF in Hex, or 1111111 in Binary. For bigger numbers you must use a pair of bytes, and the second byte is worth 256 times its face value. Just to make life difficult, the second byte (the big one) is loaded into B (the first of the pair), and the least significant byte into C. The DE and HL pairs work in the same way. Notice how some assembler phrases (DEC BC; LD A,B) translate into single code instructions. This makes for compact programs, but means that you spend a lot of time looking up codes! OR C needs some explanation. When you OR the accumulator with another number, each bit is compared with the corresponding bit of the other byte. If either, OR both of the bits is set to '1', then that bit in the accumulator becomes '1'.

```
       10101010 Accumulator at start
OR C   11100011 Number from C
       11101011 Accumulator at end
```

The effect of OR C is this: even when B has been DECremented down to zero, as long as there is something left in C, the accumulator will not reach zero. When it does, the Zero FLAG will be set, and this is what the last instruction is checking for. If it is Non Zero, then a Jump Relative takes place. Here the jump is 251, which is a backwards jump, equal to 5 places (256-251=5), and takes the program back to the DEC BC instruction.

```
10 MEMORY 40000
20 A=40001
30 READ b: IF b<>999 THEN POKE a,b: a=a+1: GOTO 30
40 DATA 1,0,255,11,120,177,32,251,201,999
50 PRINT "start"
60 CALL 40001: REM run the machine code routine
70 PRINT "end"
```

Start by moving the top-of-BASIC down to create a safe place in which to POKE the code numbers that are READ from the DATA line. You will see two extra numbers there. 201 is the code for RETurn to BASIC. Miss this out at your peril! 999 signals the end of the code numbers. The last three lines serve to show how little time it takes for the machine to count from 65280 to 0. Try it in BASIC to see the difference. The next routine brings in a new element - the use of the FIRMWARE routines that are present in the ROM. Amsoft publish a complete guide to these which tells you what the routines do, how you can control them and how they affect the registers. We are using two routines in Figure 2 - TXT SET CURSOR, which sets the print position, and TXT WR CHAR, which prints a character on the screen.

Change your practice program to see how this works.

```
40 DATA 33,12,20,205,117,187,
62,42,205,93,187,201,999
```

You should have a '*' at Row 12, Column 20.

Figure 3

```
62,66           LD A,66         key code for ESC
205,30,187      CALL &BB1E      KM TEST KEY
40,249          JR Z,-7         Jump to start if key not pressed
201             RET             RETurn to Basic
```

Those two firmware routines are used in the main sprite program given below, though there some extra instructions are needed. When you use

Source Code Listing

```
33,12,20        LD HL,12,20     Initial position
62,0            LD A,0          Initial direction
229             PUSH HL         Start of main loop
245             PUSH AF
205,117,187     CALL &BB75      TXT SET CURSOR
241             POP AF
245             PUSH AF
198,240         ADD A,240       graphic code
205,93,187      CALL &BB5D      Print
1,0,12          LD BC,0,12      Start short delay
11              DEC BC
120             LD A,B
177             OR C
32,251          JR NZ,-5        loop back if Non Zero
241             POP AF
225             POP HL          only HL actually wanted
229             PUSH HL
245             PUSH AF         the next call corrupts AF & HL
```

TXT SET CURSOR, or any other CALL, you hand the registers back to the machine, and sometimes it uses -and corrupts - them. If you are going to need that data later, you must store it safely out of the way before the firmware CALL. Lets look at the first few lines of the assembler listing for the sprite routine.

```
LD HL,12,20   Initial position of sprite
LD A,0        Initial code for sprite's direction
PUSH HL       Put HL onto the stack, for safe-keeping
PUSH AF       Store AF the same way
CALL &BB75    TXT SET CURSOR
POP AF        Get the A value back
PUSH AF       And store it again
ADD A,240     Convert the direction code into a graphic code
CALL &BB5D    PRINT the graphic
```

The STACK is a safe area of memory for temporary storage, used on the LIFO principle - Last In, First Out. Keep track of the stack! Careful management is needed here to make sure that the numbers you POP off it are the ones you want. Notice that the registers are PUSHed onto the stack in pairs. If you want to store A, you must PUSH the AF pair. The sprite program uses one other firmware call - KM TEST KEY. This tests individual keys, in much the same way as the Basic INKEY() function. See how it works with the example in figure 3. It tests for ESCape, you should include a routine like this in all your programs when you are first developing them. Machine code is not user-friendly, and a wrong instruction can easily lock you in an endless loop. (It's also very easy to force a cold restart by mistake, so do save your work before you run the code.)

We can now draw these elements together to create a simple sprite animation. Four graphics, defined by the SYMBOL lines in the Basic listing, represent a spaceship pointing in different ways. The code for the direction is managed by the A register, and can be 0,1,2 or 3 (up, right, down and left). By adding 240 to this you get the code for the graphic. The ship's position is managed by the HL register, where L stores the Row number, and H the Column. There are three key controls. The up arrow moves the ship forward, and the right and left arrows produce clockwise and anti-clockwise turns. Break out of the routine using ESC.

```
205,117,187     CALL &BB75     TXT SET CURSOR
62,32           LD A,32        code for space
205,93,187      CALL &BB5D     Print
62,0            LD A,0         code for up arrow
205,30,187      CALL &BB1E     KM TEST KEY
40,26           JR Z,26        Jump next 26 bytes if Zero (key up)
241             POP AF         reclaim direction code
225             POP HL         ..and position
254,0           CP,0           ComPare A with 0 - up?
32,3            JR NZ,3        Jump 3 bytes if not
45              DEC L          Up a row
24,15           JR 15          Jump the next 15 byte
254,1           CP 1           ComPare with 1 - right?
32,3            JR NZ,3
36              INC H          Right one column
24,8            JR 8
254,2           CP 2           Down?
32,3            JR NZ,3
44              INC L          Down a row
24,1            JR 1
37              DEC H          Left - no check needed here
229             PUSH HL        Save new position
245             PUSH AF        Protect A from the TEST KEY call
62,1            LD A,1         key code for right arrow
205,30,187      CALL &BB1E     KM TEST KEY
40,18           JR Z,18        Zero if not pressed
241             POP AF         old direction
198,1           ADD A,1        clockwise move
254,4           CP 4           check A value in range
32,2            JR NZ,2        Jump if not 4
62,0            LD A,0         reset A to 0
245             PUSH AF        new direction
1,0,32,         LD BC,0,32     delay to separate keystrokes
11              DEC BC
120             LD A,B
177             OR C
32,251          JR NZ,-5
62,8            LD A,8         key code for left arrow
205,30,187      CALL &BB1E     KM TEST KEY
40,16           JR Z,16        Jump if not pressed
241             POP AF         old direction
214,1           SUB 1          SUBtract: A=A-1
48,2            JR NC,2        Jump if Carry bit not set **
62,3            LD A,3         Reset A to 3 if below 0
245             PUSH AF        new direction
1,0,32          LD BC,0,32     delay loop
11              DEC BC
120             LD A,B
177             OR C
32,251          JR NZ,-5
62,66           LD A,66        key code for ESC
205,30,187      CALL &BB1E     KM TEST KEY
40,3            JR Z,3
241             POP AF         clear stack before return
225             POP HL
201             RET            Return to Basic
241             POP AF
225             POP HL         only HL really wanted
245             PUSH AF        save direction code
125             LD A,L         routine to check L value
254,0           CP,0           off top of screen?
32,4            JR NZ,4
46,25           LD L,25        wrap-round, top to bottom
24,6            JR 6           Jump to H check
254,26          CP 26          bottom of screen?
32,2            JR NZ,2
```

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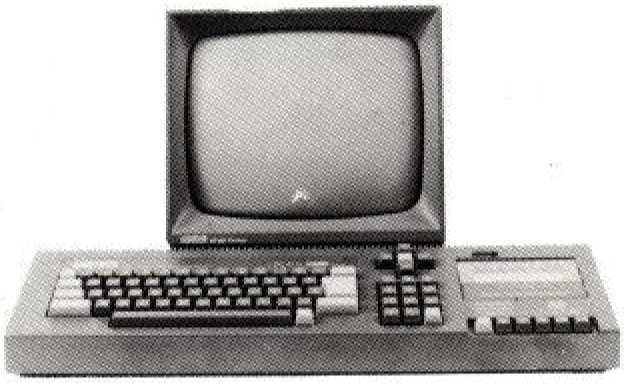
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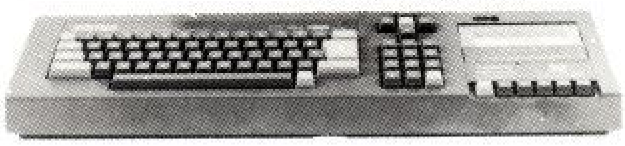




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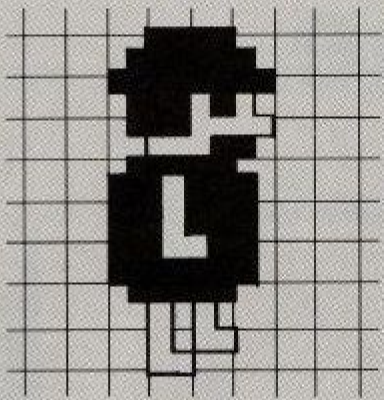
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```
46,1            LD L,1       move to top
124             LD A,H       check H value
254,0           CP 0         off left?
32,4            JR NZ,4
38,40           LD H,40      move to right edge
24,6            JR 6         jump to end
254,41          CP 41        off right?
32,2            JR NZ,2
38,1            LD H,1       move to left edge
241             rPOP AF      tidy up the stack
195,5,170       JP 43525     jump to start of main loop ***
```

** The CARRY BIT is one of the flags.If an accumulator action needs a 'borrow' then the Carry bit is set. This can happen in subtraction and in checking if the accumulator number is smaller than the other. Here the Carry bit would be set by the subtraction if A was already at zero.

*** Notice that there are two main types of jump. A Jump Relative takes the program forward, or back by a given number of bytes Relative to the current position. A Jump Positive takes the program to a fixed address. Relative jumps are easier to handle because you can move a routine to a new area of memory without having to change them. However, the maximum jump is only 127 bytes in either direction. Up to 127, the jumps are forwards, but if bit 7 is set (i.e. the number is 128 or more) then the jump is backwards. JR 240 means jump backwards 16 (256-240) bytes. These 16 include the two bytes of the JR instruction.

Here's the BASIC listing figure 4 which will create the machine code routine, and the graphics characters.

Key in the program - you can miss out the rem's -and check each line twice as you go. Save it before you make a trial run. When it's working properly, try your own variations. Change the numbers given to BC at the start of delay loops. Use different keys for your controls -you will find the codes in Appendix III, page 16 of the manual. Define your own graphics. You can even convert the program to make a crude sketchpad. Instead of printing a space to wipe out the graphic, print a block instead.

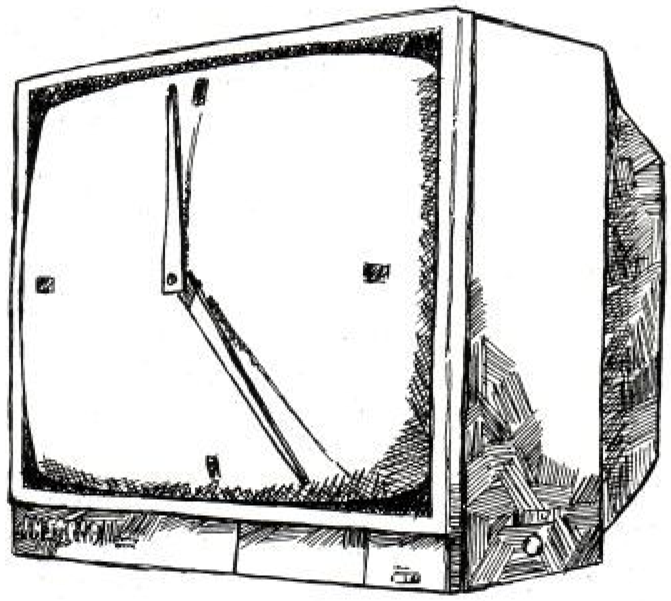
This is a very simple sprite routine. In the next issue, we will tackle the techniques needed to move larger graphics smoothly across backgrounds -true sprites.

Basic Loader Program - figure 4

```
10 'sprite starter routine
20 start=HIMEM-166:'routine can be moved
30 MEMORY start-1
40 a=start
50 READ b:IF b<> 999 THEN POKE a,b:a=a+1:GOTO 50
51 lo=UNT(start+5) AND &FF
52 hi=(start+5)/256
55 POKE a,lo
57 POKE a+1,hi
60 DATA 33,12,20,62,0,229,245
70 ' set up & store HL & A values
80 DATA 205,117,187,241,245,198,240,205,93,187
90 'set cursor & print graphic
100 DATA 1,0,12,11,120,177,32,251
110 ' delay
120 DATA 241,225,229,245,205,117,187,62,32,205,93,187
130 'print space to erase
140 DATA 62,0,205,30,187,40,26
150 'test [_] key - jump if not down
160 DATA 241,225,254,0,32,3,45,24,15,254,1,32,3,36,24,8,254,2,32,
    3,44,24,1,37,229,245
170 'check direction & adjust HL value
180 DATA 62,1,205,30,187,40,18
190 'test [->] key - jump if not down
200 DATA 241,198,1,254,4,32,2,62,0,245,1,0,32,11,120,177,32,251
210 'adjust A value  then delay
220 DATA 62,8,205,30,187,40,16
230 'test [<-] key - jump if not down
240 DATA 241,214,1,48,2,62,3,245,1,0,32,11,120,177,32,251
250 'adjust A value & delay
260 DATA 62,66,205,30,187,40,3,241,225,201
270 'test ESC key - return if down
280 DATA 241,225,245,125,254,0,32,4,46,25,24,6,254,26,32,2,46,1
290 'check H in range - adjust if not
300 DATA 124,254,0,32,4,38,40,24,6,254,41,32,2,38,1
310 'check L & adjust
320 DATA 241,195
330 'go back to print line
340 DATA 999
350 'end of code data
360 ' Graphics
370 SYMBOL 240,16,56,56,56,124,124,198,130
380 SYMBOL 241,192,112,62,31,62,112,192,0
390 SYMBOL 242,130,198,124,124,56,56,56,16
400 SYMBOL 243,0,3,14,124,248,124,14,3
410 CLS:CALL start
```

FEATURE

Amstrad Real-Time Clock & Diary



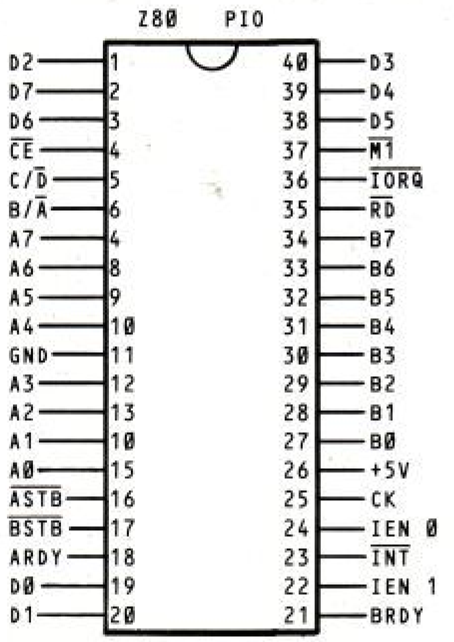
Part 1: The Hardware

Most computers these days have internal timers which can be programmed to display the time on demand, but they cannot tell you what day of the week it is and whether or not your library books are overdue! This low-cost project describes a real-time card which has battery back-up and plugs into the CPC 464 expansion port. Its applications include an electronic diary, document dating and expiry-date checking in business, and long-period thiming in science.

Choosing the Chips

Due to the high cost of some TTL chips, the clock/diary uses a design which reduces the chip count to just four devices. The timer and the Random Access Memory (Diary) are naturally CMOS since they need to be powered by a small battery when the normal 5V supply is removed. The interface logic uses that ubiquitous chip, the Z80 PIO, and it uses special software to communicate with the slow-running CMOS chips. The CMOS RAM, for example, is not "seen" directly by the computer, but instead is READ and WRITTEN in serial fashion, with a CMOS counter selecting the required memory locations.

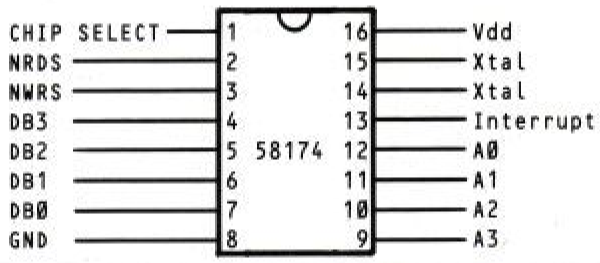
The MM58174 seems to be the most useful of the various clock-chips available at the moment and it won't strain the bank account too much either. It has the proper timekeeping facilities -- 24 hour clock and leap-year calender -- but there is no on-chip memory



Some of the timer chips also have a certain amount of scratch-RAM built into them and although this is enough to store a few alarm-time values it isn't sufficient for the storage of multiple dates and events. Figure 1 shows the pin designation of the MM58147.

Figure 1

MM58174 Pin Designation



The CMOS RAM presents no problem since the industry standard 6116 2K X 8 chip fits the bill perfectly. It has TTL compatiable inputs and outputs, and a standby power dissipation of only 100uW.

Controlling the MM58147

When the chip is first powered up it is necessary to enter the correct data into the device registers and start the clock running. The clock's 4 bidirectional data lines are used to pass BCD data to a correctly addressed clock register and in this manner all the internal counters are set to the desired time. (See figure 2.) When the time-keeping registers have all be set, the clock is started by sending a high on DB0 to register 14. Conversely a low written there will stop the clock counting. Incidentally, all starts reset the seconds counter to zero.

By some strange oversight there is no readout capability on the leap-year status register, so the micro can't tell if the current year is a leap year!

Figure 2 Internal Registers

No	Name	Mode	Address
0·	Not used		
1	Tenths of sec	R	
2	Units of sec	R	
3	Tens of sec	R	
4	Units of mins	R/W	
5	Tens of mins	R/W	
6	Units of hours	R/W	
7	Tens of hours	R/W	
8	Units of days	R/W	
9	Tens of days	R/W	
10	Day of week	R/W	
11	Units of month	R/W	
12	Tens of month	R/W	
13	Years	W	
14	Stop/Start	W	
15	Interrupt	R/W	

Obviously one of the first pieces of information that will go into the CMOS RAM is the current year and a "flag" to indicate whether the year is a leap year or not.

Reading the clock is simply a matter of reading a few of its registers, but a single READ is unwise. This is because a timer register might be updated during the actual read operation, and when this happens the MM58147 will deliberately signal an illegal BCD code of 0Fhex, 15 decimal. A value higher than nine is considered illegal on the BCD (Binary-Coded-Decimal) scale. This enables the software to look for (and thus reject) a faulty READ.

Putting the Clock on the Map

Finding just over 2K of spare memory space is often rather difficult on the more modern home computers, and the CPC 464 is a good case in point. However, since both the cock and the memory are simply data-holding devices, they can be mapped onto the computer's I/O map. Addresses have been put aside for user peripherals and if the A10 line is taken LOW to enable the interface, lines A0 to A7 can be used for decoding duties.

The prototype used bits A3 and A4, giving the addresses:

```
      1098 7654 3210
        ↓    ↓    ↓

1111 1011 1110 0111 = FBE7 Port 1
1111 1011 1110 1111 = FBEF Port 2
1111 1011 1111 0111 = FBF7 Port 3
1111 1011 1111 1111 = FBFF Port 4
```

The four ports of the PIO are as follows:

```
FBE7 Port 1 DATA IN/OUT PORT A
FBEF Port 2 DATA IN/OUT PORT B
FBF7 Port 3 CONFIGURE PORT A
FBFF Port 4 CONFIGURE PORT B
```

Circuit Description

The PIO is the fast "A" version needed to run on the computer's 4MHz clock. At switch-on the PIO automatically enters a reset state: the data lines are set to high impedence and both port output registers are reset. The chip hasn't got a reset pin as such, but the makers have included the function so that it is possible to synchronise a PIO reset with a computer reset. To make ue of this facility, the M1 (machine cycle one) signal must be passed through an AND gate (one quarter of IC5). You could probably pass the M1 signal directly to the PIO and do without this reset facility, but one of the other AND gates is a handy buffer for the timer's INTERRUPT output, so I think it is worth including. What the AND gate does is deliver an M1 pulse without the presence of a RD or a IORQ signal, and the internal workings of the PIO recognise this as a reset command. The PIO needs setting up before it can communicate with the clock and the diary, but that is a task for the software.

The clock's oscillator is formed by an on-chip inverter/amplifier with bias resistors and capacitors. A standard 32.768 kHz crystal is needed across pins 14 and 15 and it is recommended that a 5-65pF trimmer be used to fine tune the oscillator. Vdd is connected to the battery supply line and the chip will maintain its data in standby mode on voltages down to 2.2v.

The memory chip (IC3) is enabled by the PIO B7 line, but only one byte of this 2K chip is immediately accesible. The byte which is accessed is determined by the count on IC4, the CMOS 4040, which has its output pins connected directly to the address lines of IC3. A pulse from PIO B2 resets the counter, while a pulse on B0 increments the counter. Thus the memory chip can be accessed in serial fashion, one byte at a time. IC4 needs a low-going pulse to increment its counter but a high-going pulse is needed to reset it.

The 5 volt rail is capable of supplying the 1mA needed to tricle charge the small NiCad battery which provides a nominal 3.6v standby voltage to IC2 and 3.

SW1 and SW2 "write protect" the two battery powered chips so that if by chance some spurious pulses come through on the WR line and on a CE line at the instant when the mains-derived 5V is switched off, data in a memory byte or timer register wouldn't be corrupted. Switches SW3 and SW4 deselect the two chips totally, and should be open-circuit whenever the

board is moved about.

SOUND	1	2	GND
A15	3	4	A14
A13	5	6	A12
A11	7	8	A10
A9	9	10	A8
A7	11	12	A6
A5	13	14	A4
A3	15	16	A5
A1	17	18	A0
D7	19	20	D6
D5	21	22	D4
D3	23	24	D2
D1	25	26	D0
+5V	27	28	$\overline{\text{MREQ}}$
$\overline{\text{M1}}$	29	30	$\overline{\text{RFSH}}$
$\overline{\text{IORQ}}$	31	32	$\overline{\text{RD}}$
$\overline{\text{WR}}$	33	34	$\overline{\text{HALT}}$
$\overline{\text{INT}}$	35	36	$\overline{\text{NMI}}$
$\overline{\text{BUSRD}}$	37	38	$\overline{\text{BUSAK}}$
$\overline{\text{READY}}$	39	40	$\overline{\text{BUSRESET}}$
$\overline{\text{RESET}}$	41	42	$\overline{\text{ROM EN}}$
ROMDIS	43	44	$\overline{\text{RAM RD}}$
RAMDIS	45	46	$\overline{\text{CURSOR}}$
LPEN	47	48	$\overline{\text{EXP}}$
GND	49	50	CLOCK

Construction

There are just one or two points to bear in mind when building this card. Three of the ICs are CMOS and two of them are expensive so take extra care with them until the board is fully built. They should of course be the last items to go onto the board, and they must go into IC sockets. The best way to bend the pins prior to pushing the chips into their sockets is to lay the IC on a sheet of kitchen-foil and exert the necessary pressure. Be sure to ground yourself and the foil by touching a cold water pipe or tap! The suggested type of NiCad battery solders onto the board, and you may find that a small-bit soldering iron has insufficient heat to do the job. As an alternative, you might consider using a pack of three AA size NiCads in an off-board battery holder. Note that the orientation of the ICs is not uniform on the PCB version of the board. Ribbon cable connects from the board to a 25 X 25 way connector which MUST BE FITTED CAREFULLY to the Amstrad "Floppy Disc" port. If you cannot get a 25 X 25 way connector with a polarising key between position 11 and 12 (pins 21 and 23) then you must mark the edge connector to show which way round it fits. All the "Floppy Disc" port signals are shown in figure 01. --they are of course the standard Z80 CPU signals.

The BASIC routines that handle the machine code are straightforward and use small areas of RAM at &9270 to pass values to and from the machine code. They are written with a view to clarity rather than elegance, and can be incorporated into your own programs in a suitable amended form. How you deal with the 2000 or so bytes in the 6116 RAM will rather depend on how you are using that chip: as a diary store for characters, or as a back-up store for bytes of data.

Figure 3 Year Status Register

		DB3	DB2	DB1	DBfl
Leap year			1	0	0
Leap year	+1	0	1	0	0
Leap year	+2	0	0	1	0
Leap year	+3	0	0	0	1

This register is a shift register and the contents are rotated to the right every 31st December.

Figure 4 Interrupt Read/Write Register

Funtion		DB3	DB2	DB1	DBfl
No interrupt		0	0	0	0
Interrupt at	60sec intervals	0/1	1	0	0
Interrupt at	5.0s intervals	0/1	0	1	0
Interrupt at	0.5s intervals	0/1	0	0	1

Write mode:
DB3=0 single interrupt DB3=1 repeated interrupt

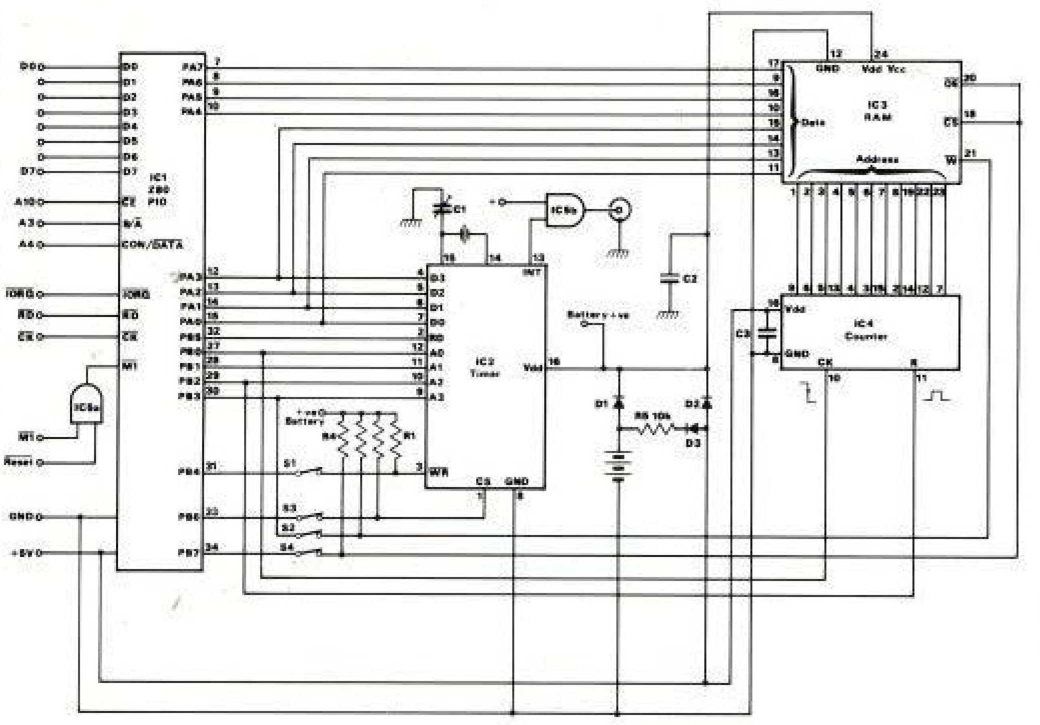
Read mode:
DB3=0 no interrupt DB3=1 interrupt given

Component List

IC1	Z80 PIO	
IC2	MM58174 Timer	
IC3	6116	2K RAM
IC4	4040	CMOS Counter
IC5	74LS08	AND gate
R1,R2,R3,R4,R5	10K	
R6	1K	
C3	100nF	Disc ceramic
C2	10uF	Tantalum
C1	5-60pF	Trimmer
X1	32.768kHz	Crystal
D1-3	1N4004	Diodes
NiCad	3.6v	
SW1-4	DIL switch	

Four IC sockets 40,24,16,16
25 X 25 0.1"socket
Ribbon cable
p.c.b.

Circuit Diagram



All of the parts used in this project are avaliable. The best places to try are:

Watford Electronics
250 High Street
Watford
Herts
(0923)40588

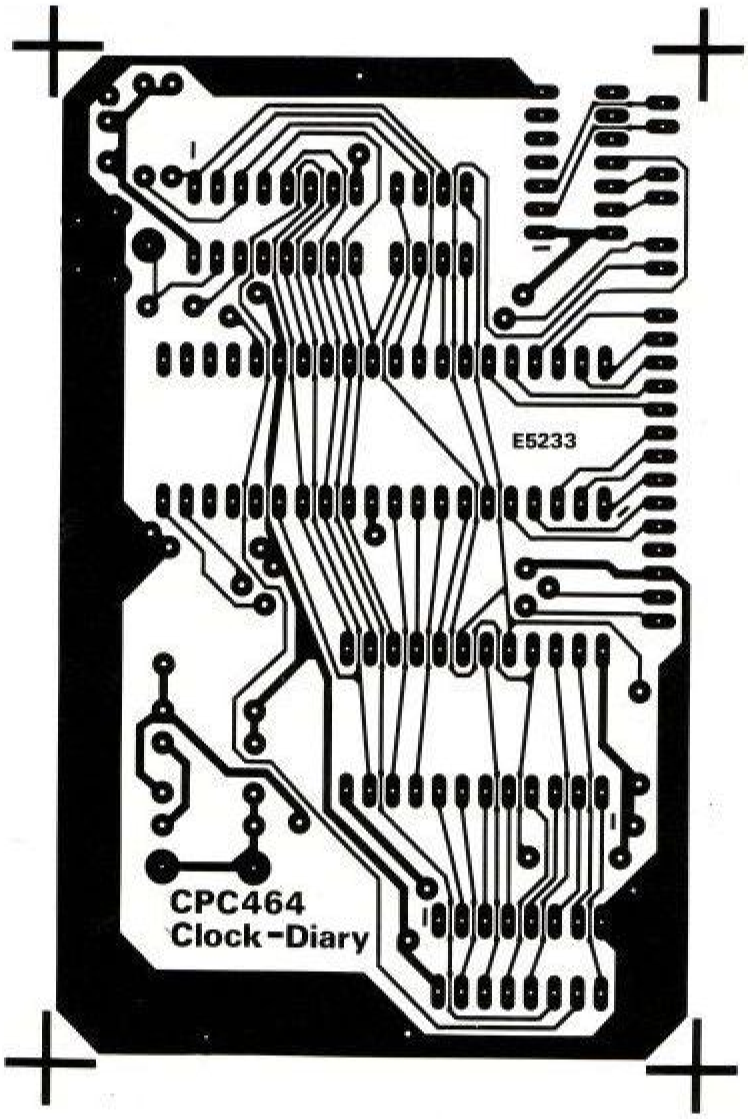
or

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(0992) 444111

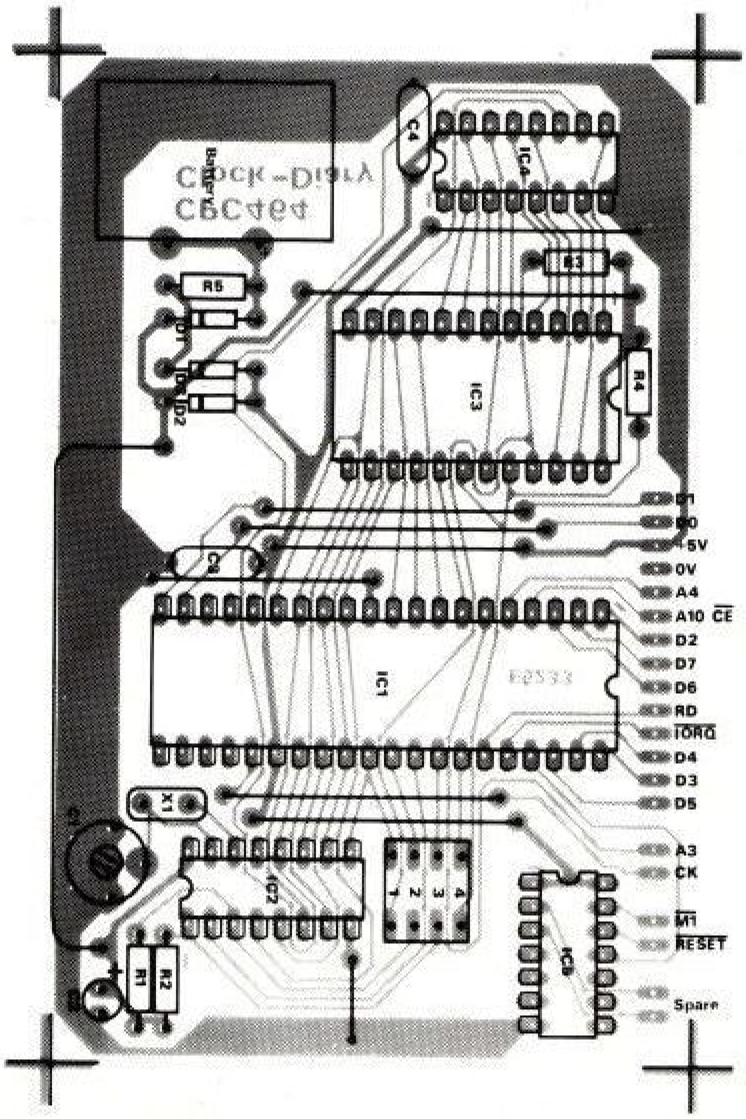
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Foil Pattern



Component Overlay



A Brief Disc-ussion.... (Part 2)

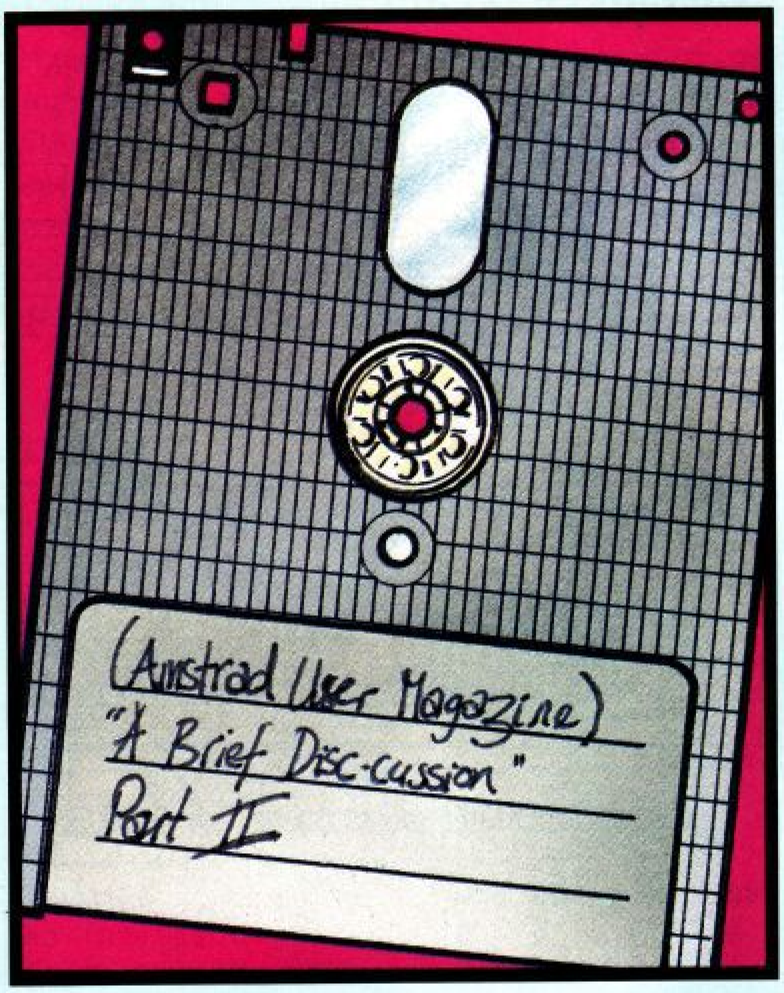
Roland Perry looks at some more ways to get more from your disk system.

The Amstrad DDI-1 disc interface provides two operating environments, AMSDOS and CP/M. A high degree of compatibility is provided for files so that they may be used in either environment. CP/M uses the character &1A (^Z) to indicate the end of file and therefore AMSDOS must take account of this. Unfortunately, MERGE or CHAIN MERGE of normal (internal format) files by AMSDOS is likely to abort early with an 'EOF met' error if a &1A character is found.

The patch published below intercepts the firmware entry CAS_IN_CHAR to stop &1A being treated as end of file. Before accessing a file using an OPENIN the original contents of the jumpblock should be replaced. This will restore the EOF action. Simply issuing a |DISC command is suitable for this.

```
100 REM
110 REM Work-around to allow MERGE
    of internal format files
120. REM under AMSDOS when using BASIC
    Version 1.0
130 REM            developed by
    Locomotive Software, Nov 1984
140 REM
150 MEMORY HIMEM - 41
160 DEF FNmsb(a) = &FF AND INT(a/256)
170 DEF FNlsb(a) = &FF AND UNT(a)
180 FOR i = HIMEM+1 TO HIMEM+38
190     READ byte: POKE i,byte
200 NEXT
210 POKE HIMEM+ 3, FNlsb(HIMEM+39)
220 POKE HIMEM+ 4, FNmsb(HIMEM+39)
230 POKE HIMEM+ 9, FNlsb(HIMEM+41)
240 POKE HIMEM+10, FNmsb(HIMEM+41)
250 POKE HIMEM+18, FNlsb(HIMEM+ 1)
260 POKE HIMEM+19, FNmsb(HIMEM+ 1)
270 REM CAS_IN_CHAR = &BC80
280 POKE HIMEM+39, PEEK(&BC80+0)
290 POKE HIMEM+40, PEEK(&BC80+1)
300 POKE HIMEM+41, PEEK(&BC80+2)
310 POKE &BC80+ 0, &C3
320 POKE &BC80+ 1, FNlsb(HIMEM+1)
330 POKE &BC80+ 2, FNmsb(HIMEM+1)
340 DATA &e5,&2a,&00,&00,&22,&80,&bc
350 DATA &3a,&00,&00,&32,&82,&bc
360 DATA &cd,&80,&bc,&21,&00,&00
370 DATA &22,&81,&bc,&21,&80,&bc
380 DATA &36,&c3,&e1,&d8,&c8,&fe,&1a
390 DATA &37,&3f,&c0,&b7,&37,&c9
```

It is fairly straightforward to arrange for a BASIC program to detect if a DDI-1 disc interface is installed.

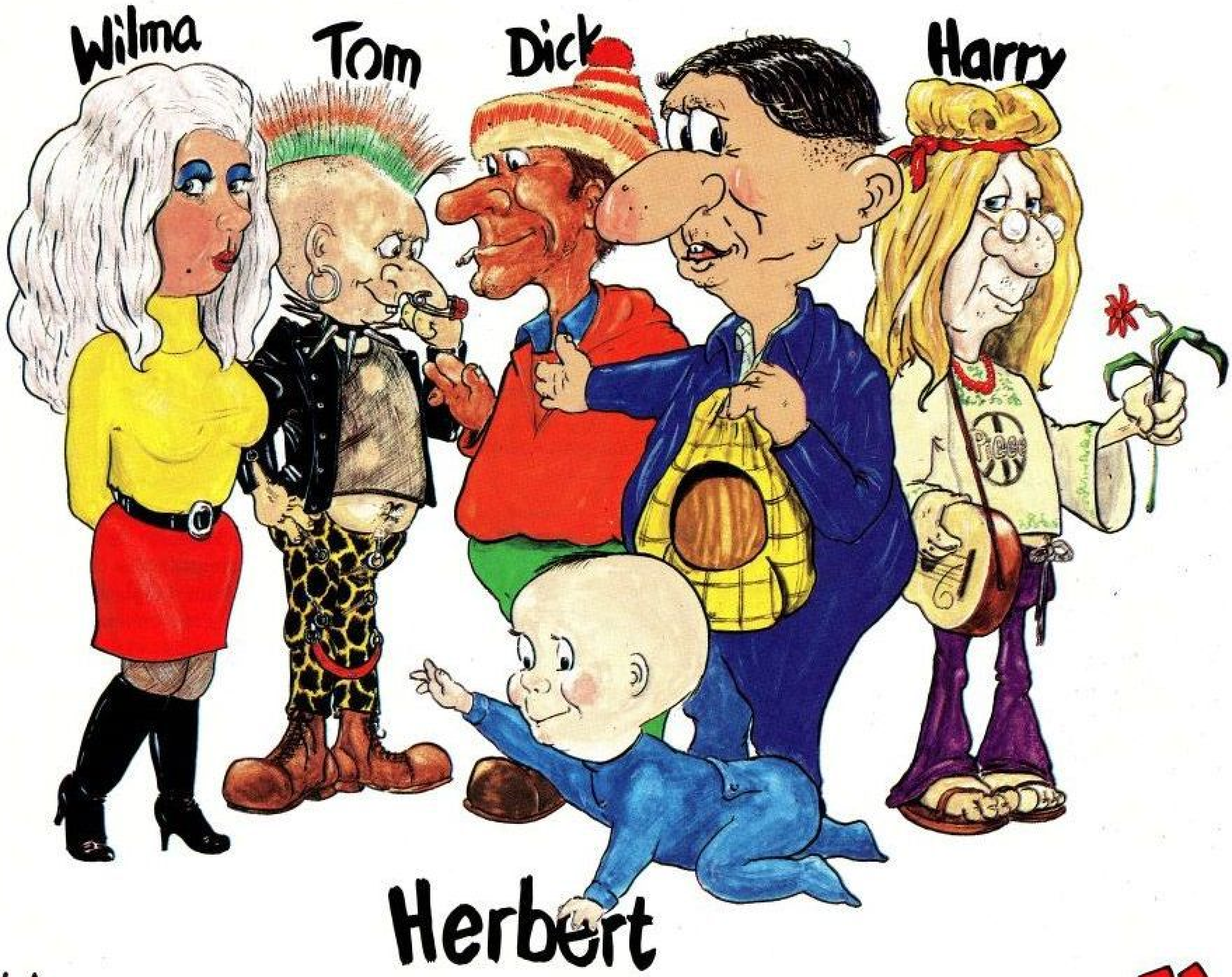


This is particularly useful in order to verify filenames before passing them to AMSDOS, which does not like null or over-length filenames. Another application is to allow the program to offer the user a choice of Tape or Disc for loading or saving, where appropriate.

The test is performed by setting up an ON ERROR routine and then deliberately trying to provoke an error 28 (Unknown Command) from the otherwise innocent external command |DISC. If the error occurs then there cannot be a DDI-1 installed. The lines of below, extracted from a typical program, illustrate this action.

```
10 discinstalled=(1=1):ON ERROR GOTO 20:
   |DISC:GOTO 30
20 IF ERR=28 then discinstalled=(1=0):
   RESUME NEXT
30 ON ERROR GOTO 0
 .
 .
 .
500 IF discinstalled then 540
520 INPUT "Filename, or [ENTER] for next
    on tape",f$
530 GOTO 580
540 INPUT "Tape or Disc (T/D)",td$
550 IF UPPER$(td$)="T" then 520 else if
    UPPER$(td$)<>"D" THEN 540
560 INPUT "Filename",f$
570 IF f$="" THEN PRINT "Invalid
    filename":GOTO 560
580 OPENIN f$
```

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Writing Adventures

Adventure games are becoming more and more popular as time goes by. Perhaps this is because the average age of the computer user is increasing, or that 'zap-em' games lose their appeal after the main variations have been tried! Whatever the reason, a game requiring logic and deduction offers many things to many people. To some, it is the challenge of solving puzzles. To others it is the opportunity to step outside the reality of the world around them, and walk, run, jump and explore a new dimension altogether.

This particular 'new world' is not limited by time or space. Neither by the air-fare nor by the time you can take off for your annual holiday! What is more, adventure games are not like books, where the story is about someone else... This tale is about the player. The action that he/she takes is his/her own - not predetermined as in a book. Every move matters and a good game can have the player really 'sweating blood' on occasions...the next decision may be their last...

There are already a number of good adventure games available for the Amstrad CPC464 but there is always room for more! Perhaps you already have the germ of an idea in your mind just waiting to be born. In the next few issues we will tell you how to change that 'idea' into the real thing!

Adventure games are never things that can be produced overnight. Some take weeks or even months to see the light of day. The time taken may sometimes be frustrating but it will never be boring! Just as there are thousands of books that have completely different plots, and so it is with the adventure game; if you look at any library you will see that the books fall into fairly distinct types -detective, historical, thriller, romance, fantasy, western, science-fiction etc.

Authors are always writing new detective novels, and are not being criticised for copying the plots of other authors. The same must hold true for adventure games - if you want to write one that has orcs, trolls and magic wands - then go ahead. It will be 'yours', it will have 'your puzzles', 'your story' and 'your punch-lines'. Do not be put off by people saying there are too many 'dungeon adventures' or "not another escape from a spaceship...". Yours may very well be better than the rest anyway!

Of course if you can think up a completely new idea, then so much the better. Whatever your plot is, start making a few notes now. Before you can start putting those sizzling ideas into the computer you must have quite a bit written down on paper...

Starting from scratch

Right, you've decided you want to program an adventure game....what next? The plot has to be yours! That is one thing we can't help you with, but we can tell you of the means whereby your plot is translated into a program.

Adventure games are in essence quite simple programs. They follow the pattern shown in figure 'A'.

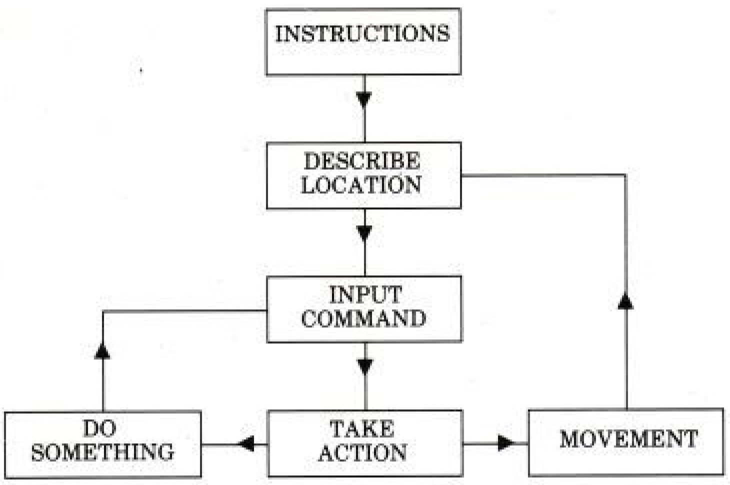


FIG A

You may first give the player some simple instructions on how to play the game...but many games leave this out. After all, that is often part of the overall puzzle - that oft' asked question: "why are we here?"

Back to our program; this takes the form of a continuous loop: first the player is given a description of what is around him/her (ladies please read she/her in future where you see he/him/his!). Next, the player has to make a decision, either to move somewhere else or to take some other sort of action. On the outcome of this decision he is told what happened and if it were a movement request - where he is now.

We are now back to our description of a location... This pattern is repeated again and again. With the player moving from place to place and 'examining' objects or using the objects that he finds along the way. Sounds simple enough doesn't it?

The Amstrad is a good machine for potential adventure writers. Unlike several other computers in the same general specification range, it has over 40K of memory ready to accept the user's BASIC program. Memory is a valuable commodity in this sort of program. Displaying text is expensive on memory space - graphics can be worse!

Several features of Amstrad BASIC also make life much easier for the poor old programmer too. The use of 'windows' can greatly enhance the presentation of the display. The ability to 'count through' strings, and WHILE...WEND, all come into there own in these programs.

An adventure game is made up of a number of repeating routines describe, inform, ask, act, describe, inform etc. These routines will finally be interlinked to create the final adventure, but many of them can exist or partially exist on their own. If not completely self contained, they can be added to existing routines as you go along. These 'modules' will be described in such a way that you can insert them into your own programs. Between issues, 'you' will

have to supply the data that will flesh out 'your' game to eventually produce a fully fledged 'Adventure'.

Pre-programming

Before you ever switch on your Amstrad, you MUST have more than just an idea of what form your adventure is going to take. Arm yourself with plenty of paper, a pencil and a good rubber. The latter is vital...

The plot has to take place somewhere! Your first task is to draw a map of the terrain. An Ordnance Survey type of map is no good... you will probably not be able to move in just any old direction! Stick to the cardinal compass points -north, east, south, west and perhaps up and down - to start with, So, your map should look something like that shown in figure 'B'. Each little box represents a different location and the lines linking the boxes indicate the permissible paths between these locations.

Each location should have a number, and depending upon your 'story' not every path between locations will immediately be accessible to the player! Neither will all paths be 'two way', to confuse the issue, you may wish to only allow movement FROM '4' TO '6' and not return by the same route!

Having drawn your preliminary map, it may be worthwhile drawing sections of it in more detail. Include in this the information for EVERY possible direction. Figure 'C' shows how to do this, the loop to the east of '7' only takes the player back to '7'. The 'T' to the north of '5' indicates that the player cannot go in this direction.

Note must also be made of paths that may be 'secret' or that have to be 'opened' by some action on the part of the player!

Along with the map must also be noted those objects or artifacts that may be found in the various (numbered) locations. These objects may not be immediately obvious and may only be found either if the player has or is wearing a particular item -perhaps found elsewhere...

Having completed or nearly completed (we are all somewhat impatient...but let it be on your own head!) the above 'scene setting' you can proceed with the modular programming below.

Modular approach

Writing adventure programs are particularly fascinating projects. There are in fact many ways to achieve a very similar end product. Areas of special interest are memory conversation and the speed with which the program responds to a player's commands. Many, many hours can pleasurably (and profitably), be sent thinking up better routines.

The routines suggested here are not by any means the optimum way of proceeding but nevertheless will give a fairly acceptable result - in fact, better than a number of commercial products we know. They are presented in a form that should make them clear to the novice programmer -providing he has not lost his copy of the 'Amstrad CPC464 User Instructions'!

Each 'module' should be entered with the line numbers as shown. Each article will add to those routines already given and should (the gods willing)

LIST 1

```
10 KEY 128,"list ":KEY 129,"print #":KEY
    130,"data ":KEY 131,"cls"+CHR$(13):K
   EY 132,"locate #"
15 KEY DEF 7,1,44
```

LIST 2

```
92 REM
99 REM ** Initialise
100 MODE 1:CLS:BORDER 1
105 KEY DEF 39,1,32
150 DIM Q$(1),L$(50)
155 DIM N(50),E(50),S(50),W(50),U(50),D(
    50)
160 SCORE=0:L%=1:LC%=0:I%=0:X%=0:I=0:DL=
    0
180 WINDOW #1,1,40,1,9
185 WINDOW #2,1,40,10,20
190 WINDOW #3,1,40,22,25
195 INK 0,1
200 INK 1,0
205 INK 2,11
210 INK 3,20
215 PAPER #0,0:PEN #0,3
220 PAPER #1,0:PEN #1,3
225 PAPER #2,2:PEN #2,1
230 PAPER #3,3:PEN #3,1
235 FOR I%=1 TO 6:REM ** Number of locat
    ions
240 READ L$(I%),N(I%),E(I%),S(I%),W(I%),
    U(I%),D(I%)
245 NEXT I%
300 GOTO 1000
```

LIST 3

```
451 REM
499 REM ** Determine new location
500 LC%=N(L%):RETURN
505 LC%=E(L%):RETURN
510 LC%=S(L%):RETURN
515 LC%=W(L%):RETURN
520 LC%=U(L%):RETURN
525 LC%=D(L%):RETURN
```

build into a workable operating system. Occasionally line numbers will be repeated - the latest line number will be correct. This duplication will have been to allow you to test an earlier routine (or because I've made the error of being human)!

The program proper starts at line 100. Those lines given in LIST 1 are to assist you in writing and debugging the program. Line 10 programs five of the numeric keypad keys (0 to 4) to save you having to type LIST, PRINT, DATA, LOCATE, or having to type CLS and then RETURN to clear the screen. Line 15 redefines the '.' on the numeric keypad to give you a ',' -more of this later when we come to the 'input command' routine.

Refer to listing 1.

Lines 100 to 245 set up vaiables and arrays, define windows and paper, pen and ink colours. Line 105 is related to line 15 above and redefines the normal ',' to be a space. Lines 150 and 155 dimension the arrays needed for this article's routines, those that are set to 50 indicate the number of

```
LIST4
949 REM ** General purpose delay
950 FOR I=1 TO DL*300:NEXT I
955 RETURN
```

```
LIST5
999 REM ** Start game loop
1000 WHILE score < 100
1010 CLS #3
1099 REM ** Print location description
1100 CLS #1
1110 LOCATE #1,2,1
1120 PRINT #1,L$(L%)
1299 REM ** Print location number
1300 CLS #2
1310 LOCATE #2,2,2
1320 PRINT #2,L%
```

locations expected - 50 is quite a lot to start with but set yours to the number of locations you have mapped out.

Line 160 assigns the numeric variables to be used. With the Amstrad this is not strictly necessary but it is a good habit to add to this line EVERY time you use a new variable. That way you should be able to keep track of what variables have been used!

The three windows have been chosen to display the location description, what additional items can be seen or what happens if you 'do something', and for the 'input commands'.

Now look at listing 2

The colours chosen in lines 195 to 230 are my preference...you may have other ideas.

Lines 235 to 240 READ the DATA for the location descriptions into L$(50) and the destination location numbers into N(50), E(50) etc. (NESW and Up and Down). There are only six locations described as yet, hence the FOR...NEXT loop in line 235 only going to six and not 50! An integer number 'I%' is chosen because the computer deals with an integer very much more quickly than with a non-integer variable such as 'I'.

Line 300 directs the program to the start of the 'game loop', past the subroutines that will be placed between lines 300 and 1000. Subroutines are actioned more quickly the earlier they appear in the program. Routines called frequently will appear here. Those whose speed of implementation is unimportant will appear towards the end of the program.

Listing 3 shows the six subroutines that determine the number of the location that may be reached by moving N, E, S, W, U, or D from the present location 'L%'. This is assigned to a temporary variable 'LC%' as there may be some reason that would cause the move to be aborted, so the present and probable future position is retained for the moment.

In listing 4, line 950 is a general purpose delay, the length of which is set by variable 'DL' - no need for an integer here, as a delay implicitly requires a 'wasting of time'!

Line 1000 is the start of the 'game loop'; it ends with the WEND in line 3000. The 'score' has been arbitrarily set to 100, should this figure be reached then the program will then, and only then continue past line 3000.

Lines 1100-1120 place the present location description in the top display window. 'L%' was set to '1' in line 160, so the game will start from location 1. Lines 1300-1320 at present display the location number in the second window, to enable you to verify that 1) the description is the correct one, and 2) for you to check that movement destinations are as you would expect!

Lines 1500-1560 offer a simplified 'input command' routine. Line 1530 clears the keyboard buffer of any stored characters (the player could inadvertantly press other keys during some other phase of the game - these would be stored in the 'buffer' and would appear when the INPUT in line 1520 was requested).

The 'input command' is assigned to array 'Q$(1)'. An array is used so that we can ERASE its contents immediately prior to calling for a new INPUT. If a string variable is used say 'Q$', then every time it is assigned (at each 'input command') a new 'Q$' is written in memory. At some point the computer decides that enough is enough and performs what is called a 'garbage collection' and erases all unwanted variables (all those previous 'Q$s' for instance) from its memory. Depending upon the program (and type of computer) this operation can take seconds, minutes or longer! ERASEing the array 'Q$' in line 1500 forestalls an unexpected event!

Line 1540 simply checks to see that the player has entered something and has not just pressed ENTER. Line 1550 checks to see that not more that 26 characters have been input - an arbitrary number which stops commands overlapping the screen width, and should be sufficient for our purposes...

Line 1560 converts the 'input command' to all upper case characters - so that we can more easily analyse what has been asked.

One snag with using the simple form of input using INPUT, is that a ',' signifies

```
LIST6
1499 REM ** Input command
1500 CLS #3:ERASE Q$
1510 LOCATE #3,2,2
1520 WHILE INKEY$<>"":WEND
1530 INPUT #3,"What now ";Q$(1)
1540 IF Q$(1)="" THEN 1510
1550 IF LEN(Q$(1))>26 THEN CLS #3:LOCATE
     #3,2,2:PRINT #3,"Input too complex
     ...":DL=4:GOSUB 950:GOTO 1500
1560 Q$(1)=UPPER$(Q$(1))
1999 REM ** Analise command
2000 X%=INSTR("NESWUD",Q$(1))
2010 IF X%=0 THEN 1500
2020 ON X% GOSUB 500,505,510,515,520,525
2030 IF LC%=0 THEN LOCATE #3,2,2:PRINT #
     3,"You may not move in that directi
     on":DL=4:GOSUB 950:GOTO 1500
2040 L%=LC%
3000 WEND
```

LIST7

```
10010 DATA "You are in a city square tha
       t has small buildings made of wood
        and stone all    around it. It is
        early in the morning   and there
       are no people in sight."
10015 DATA 2,2,5,2,0,0
10020 DATA "This is a narrow street with
        houses on  both sides. It is diff
       icult to get your direction as the
        houses all look the     same!"
10025 DATA 2,3,2,2,0,0
10030 DATA "A narrow street with shops,
       all closed  but for a dingy lookin
       g building that   lies to the east
       . Outside the building  there is a
        battered sign of a knight    ridi
       ng a horse."
10035 DATA 3,4,5,2,0,0
10040 DATA "Dust lies everywhere, an ben
       t old man    is standing quietly at
        the back of the  room. A wide oak
       en counter is against   one wall."
10045 DATA 0,0,0,3,0,0
10050 DATA "This is a narrow street with
        houses on  both sides. It is diff
       icult to get your direction as the
        houses all look the     same!"
10055 DATA 3,6,5,1,0,0
10060 DATA "This is a narrow street with
        houses on  both sides. It is diff
       icult to get your direction as the
        houses all look the     same!"
10065 DATA 6,7,6,5,0,0
```

to the computer that a second input is being given. The program only expects one input - 'Q$(1)' - so returns with "redo from start", followed by our "What next?". This is not only user unfriendly but also looks messy as it scrolls up window 3.

To overcome this, the comma ',' has been redefined as a space (line 105). BUT to enable you to carry on programming without redefining keys all the time, the '.' on the numeric keypad has been temporarily made a ',' (line 15 will be deleted when the program is finished!)

Lines 2000-2040 look at what has been input and at present only look for a single key entry for direction. Line 2000 assigns 'X%' to the numeric position in string "NESWUD", depending upon the contents of 'Q$(1)'. If the direction command is valid, the new location is determined by the subroutines at lines 500-525. The new location is assigned at line 2040 and the 'game loop' is repeated.

The description DATA is fairly obvious, the larger spaces between words are so that a word does not 'wrap round' from one line to the next. This sytem only allows a description limited in length to what you can get on one program line. This should be enough to give something more than "You are in a dark cave"!

Just remember that text gobbles up memory and that if you had 50 fully described locations, you will have used over 12K of memory. In fact its a lot worse than this because we then assign all those descriptions to individual array elements, thereby doubling the memory requirements... Just don't go too mad and I'll tell you next time how to recoup some of that memory later if you need it!

If the input is invalid ('X%'=0) then a further input is requested by returning to line 1500. If the direction chosen is not permitted (blank wall etc.) then line 2030 displays a message and another input requested.

We finally come to the bit that you have to think out for yourself! Listing 7, lines 10010 and so on, are the DATA for the location descriptions immediately followed on the next line (10015, 10025 etc.) by the destination location DATA.

The destination location numbers in DATA lines 10015 etc. are in the order -North, East, South, West, Up and Down. 2,2,5,2,0,0 means that from this location the player can move to location '2' by travelling North, East or West. To location '5' by moving South and that to move Up or Down is not permitted.

I have programmed the location descriptions and destinations as 10010, 10015, 10020, 10025 so that the 'tens' in each case relate to the location number - this helps somewhat if you have to change or debug any of them later!

The listings given so far will enable you to create your own 'landscape' and move around in it. Next time we'll look at how we can place a few objects around this 'landscape'...

By 'Brock'

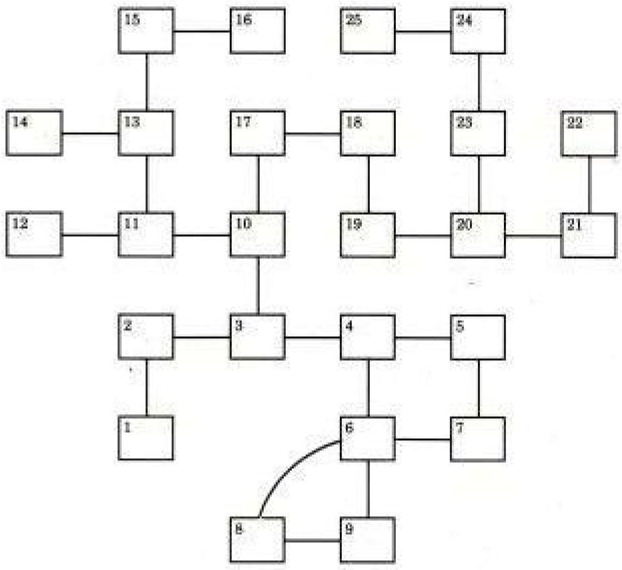


FIG B

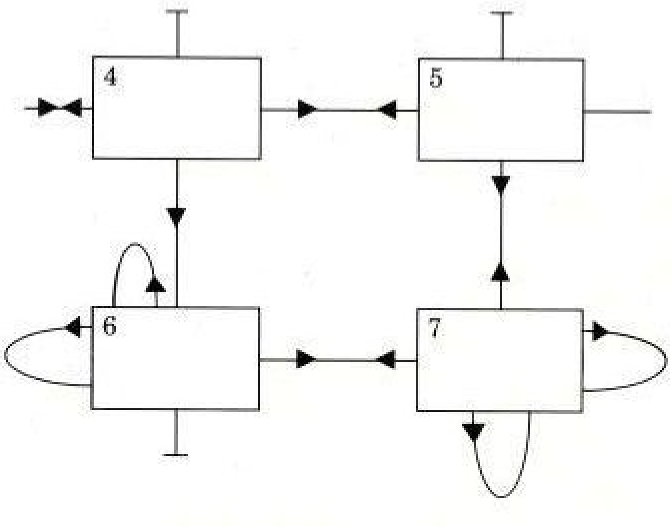


FIG C

ARNOLD BLACKWOOD - ADVENTURER EXTRAORDINAIRE

* * *
* * * * * *

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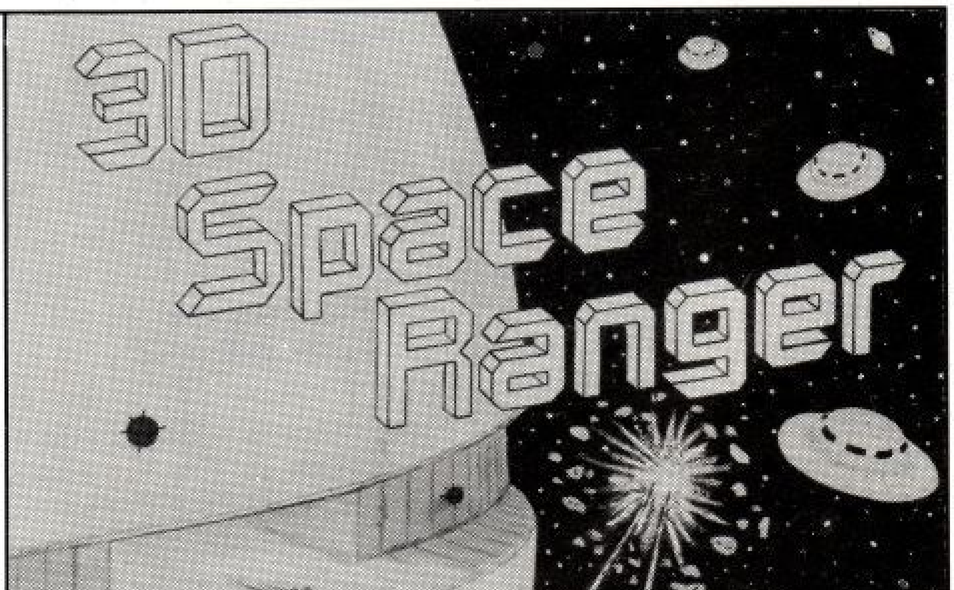
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EMERALD ISLE

Emerald Isle lies in the Bermuda Triangle, hidden by fogs and peopled by the remnants of a strange civilisation. This great new adventure has 200+ locations and 200+ pictures on the Amstrad, BBC, Commodore 64, MSX and Spectrum.

As an adventure fan, I viewed the prospect of reviewing the latest Level 9 game with excitement. This particular game marks something of a landmark since it's the first Level 9 adventure with graphics and, much to my surprise, the game doesn't suffer adversely. Granted the location descript... shorter than before... assured there is... text.

The game... Snowball an... ego Kim Kir... the Planet Ec... life. The sc... with about 2... of them illustra... any details of the ... keep you busy for man... hour.

The game is full of tricky puzzles, some horrendously devious. You gain points for solving the adventure, not for collecting treasure.

The illustrations are drawn in multicolour mode and while relatively simple, are well designed and do enhance play. Best of all, they're drawn quickly. The game is accompanied by a very good instruction manual and the usual envelope for a free hint.

Overall, excellent value which, in my view, is unsurpassed by any other software house in this country. Buy it and enjoy. A.W.

Level 9 produces a range of text games that are inventive, involved and usually large. If you're keen to try out a version of the original mainfr... venture its Colossal Adventu... lot of similarities but has more ... and a slightly altered set of p... Other games by the same ... carry on from ...

Pick of the week

Hard core adventure fans and all persons of taste and discernment will be delighted to hear that the sequel to *Snowball*, *Return to Eden* is now available ... than almost anywhere else. You'll need it. A mandatory purchase for adventure fans

CRASH Readers Awards 1984 Winner

BEST TEXT-ONLY ADVENTURE

SNOWBALL

by LEVEL 9 COMPUTING

Text-only adventures still represent a large chunk of the market, with Level 9 one of the most respected (although they too have turned to graphics with their latest release). *Snowball* won this category hands down, with *Dennis through the Drinking Glass* by Applications coming in second and Incentive's *Mountains of Ket* following close behind. There were many votes in this category for games which were not copyrighted in 1984, and were thus ineligible

In adventures it is usual to boast of the number of locations, but *Snowball* probably takes the biscuit with over 7,000. Of the game, Derek Brewster said, 'This is very much my idea of an adventure and is set to become a classsic.'

Return to Eden

A new title from Level 9 is always reckoned to be an Event, and Pete Austin groupies won't find anything to disappoint them in Return to Eden – which also marks Level 9's first graphic offering. I'm still not sure whether ...ures actually improve my ...ment of an adventure – but ...'s visual appeal makes a ...ng case for them. Return ...atures nearly 280 ...m told) and those I ...o explore were ...d quickly drawn. ...features ...m Kimberley ...ting 110% in ...herself trying ...er rap in ... and ...d to me ..., it sure ...awberry

...unter stacks of absorbing puzzles ...ng for logical and/or inspired solutions, but the truly confounded (or just simple cheats like me) can write to Level 9 for a free sanity-saving clue sheet.

...ridge ...to Eden ...el 9 Computing ...9 Hughenden ...oad High Wycombe Bucks HP13 5PG

...'s other games. ...act, Pete Austin is ...olific in adapting his ...es to other machines, ... I fully expect them ...be available on washing ...achines soon! Briefly, it's fully up to Level 9 standard. And that's praise indeed.

...9's *Dungeon Adventure*- ...descriptions of the vario... ...s and characters in the ...e superb — and once ... find it very difficult to drag ...e of the world hidden ...the computer. Be warned, *Dungeon Adventure* certainly gets ten out of ten for addictive quality!

Popular

It also includes graphics, and is full of the frustration problems which are Level 9's hallmark.

Available from the HMV Shop and good computer stores everywhere. If your local dealer doesn't stock Level 9 adventures yet, use the coupon to buy them from us, or ask him to contact: Centresoft, Gay Byrne, Greyhound, Lazer, Leisuresoft, Lightning, Lime Tree, LVL, MCD, Microdealer, R&R, TBD, Thorn EMI, Tiger, Websters, Wonderbridge etc.

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Stereo Output

To utilise the Amstrad stereo output on the back of the computer, the interface has a built in stereo amplifier, this gives all sound output a totally new dimension and greatly improves the sound quality and volume over the computer's internal speaker. Any sound that previously came out of the mono speaker will now be sent out via the interface in stereo. All programs that use the sound in anyway (i.e. commercial software) will now output through the interface, which is fitted with volume and balance controls.



Speech Synthesis

The Amstrad speech synthesis utilises parts of the spoken word known as allophones. These are actual sounds that go to make up speech. The SP0256 allophone speech synthesis technique provides the ability to synthesize an almost unlimited vocabulary. Fifty-nine discrete speech sounds (allophones) and five pauses are stored in the speech chip's internal rom.

Text to Speech

Although there are only 26 letters in the alphabet, letters have a totally different sound when used in different words. For example, The "a" in 'Hay' is much longer and softer than in 'Hat'. When you speak you automatically make adjustments because you know just how a word should sound Not quite so easy with a computer.

The machine code software is mainly developed to this mode of operation. 3.5K is used for tables which contain the rules & exceptions to the rules of the English Language.

e.g. I before E except after C) This therefore allows the user to enter words to be spoken in normal English.

New Basic Commands

There are 8 new Basic Commands which control all the functions of the interface. Making the Synthesizer very easy to use. You can even control the speed at which it will talk to you. Or use the synthesizer to create sound effects like a fourth sound channel.

10 PRINT " 'AMSTRAD' "

The above is an example of the Syntax for entering speech into the computer and shows how simple it is to use.

The instruction book gives comprehensive details and examples of how to use the interface both from machine code and basic.

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Speakers

Supplied with the Speech Synthesizer are two high quality 4" speakers these have been designed to compliment the Amstrad Computer. They are fitted with 1 metre of cable and can be positioned for the best stereo effect. The synthesizer interface fits neatly on to the rear of the computer. It has a through connector to enable other interfaces (e.g. Disc Drive) to connect to the rear of the synthesizer for ease of expansion Please send S.A.E. for a copy of the instruction manual which will give full and comprehensive details.

dk'tronics

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